THESIS

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DOCTOR OF MEDICINE

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DECODING STILL BIRTHS USING "RELEVANT CONDITION AT DEATH (RECODE)" CLASSIFICATION: A CASE CONTROL HOSPITAL-BASED STUDY

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INTRODUCTION

INTRODUCTION

Stillbirth, defined as the birth of a baby with no signs of life after a specific gestational age (typically ≥20 weeks in the United States or ≥24 weeks in many other countries), is a devastating event with profound emotional and social impacts on parents and families. Despite advancements in antenatal and perinatal care, stillbirth remains a significant public health issue globally. According to the World Health Organization (WHO), an estimated 2 million stillbirths occur annually, with the majority concentrated in LMICs [1]. Identifying the causes of stillbirth is crucial for effective prevention strategies. The "Relevant Condition at Death" (ReCoDe) classification system provides a structured framework to categorize causes of stillbirth. Introduced in 2005 by Gardosi et al., ReCoDe addresses the limitations of previous systems by focusing on conditions present at the time of death [2]. This classification aims to improve the understanding of stillbirth etiology, guide public health interventions, and inform clinical practice.

The prevalence of stillbirth varies widely across regions due to differences in healthcare systems, socioeconomic status, and cultural practices. High-income countries report stillbirth rates of approximately 3–5 per 1,000 births, whereas in LMICs, rates can exceed 25 per 1,000 births [3]. Sub-Saharan Africa and South Asia account for nearly two-thirds of global stillbirths [4]. Key risk factors include maternal health conditions, inadequate access to healthcare, and intrapartum complications. Hypertensive disorders, diabetes, infections, and obesity are significant contributors to stillbirth [5]. Poor antenatal care, placental dysfunction, and delayed recognition of fetal distress further elevate risks [6]. Socioeconomic factors such as poverty, illiteracy, and limited access to healthcare disproportionately affect vulnerable populations, exacerbating stillbirth rates [7]. Fetal factors like congenital anomalies and growth restrictions also contribute to a subset of stillbirth cases [8].

Previous systems for classifying stillbirths, such as the Wigglesworth and Aberdeen classifications, were criticized for their ambiguity and inability to account for multiple contributing factors [9]. The ReCoDe classification system addresses these gaps by identifying conditions directly or indirectly relevant to the cause of death. It

categorizes stillbirths into specific groups based on the condition most relevant at the time of death, emphasizing a comprehensive assessment of maternal, fetal, and placental factors [10]. Key categories include fetal factors such as congenital anomalies, infections, and growth restrictions; placental factors like insufficiency and abruption; maternal factors including hypertension and diabetes; intrapartum events like birth asphyxia and cord accidents; and external factors such as trauma or environmental exposures. The ReCoDe system provides systematic identification of causal conditions, is applicable across various healthcare settings, and facilitates targeted interventions and resource allocation.

Applying the ReCoDe system involves detailed investigations, including clinical history, placental examination, fetal autopsy, and laboratory tests. Studies have shown that ReCoDe can identify a cause in up to 90% of stillbirths, compared to traditional systems that often leave many cases unexplained [11]. However, implementing ReCoDe in LMICs faces significant challenges. Limited availability of diagnostic tools and skilled personnel hinders comprehensive stillbirth investigations [12]. Cultural stigma associated with stillbirth and lack of awareness impede reporting and classification efforts [13]. Poor record-keeping and inconsistent data collection further affect the reliability of classification results [14].

Improving stillbirth outcomes requires strengthening antenatal care, enhancing healthcare access, and advancing research. Early identification and management of maternal and fetal risk factors are crucial for prevention. Investments in healthcare infrastructure and training can reduce disparities in stillbirth rates. Further studies are needed to refine classification systems and identify novel interventions. Future directions in stillbirth research include integrating genomic studies to uncover previously unidentified causes, especially in cases with congenital anomalies [15]. Machine learning algorithms could assist in analyzing large datasets to predict stillbirth risk factors and outcomes [16]. Global initiatives, such as the Every Newborn Action Plan, emphasize international cooperation to reduce stillbirth rates [17].

Stillbirth remains a pressing global health issue, particularly in LMICs where healthcare disparities persist. The ReCoDe classification system offers a structured approach to understanding the causes of stillbirth and guiding preventive measures.

NEED FOR THE STUDY

The complete & exact cause of stillbirth (SB) is missing in most documents which is must in prioritizing corrective measures by policy makers. Classifications of perinatal deaths are needed for health care policy, surveillance, international comparisons, clinical services, and research. There is a wide variety of these classifications in the literature, reflecting differences in criteria and available information for recording stillbirths and in existing health information systems over time and between countries. Some of them include categories best suited for epidemiology and health care planning purposes, including risk factors such as small for gestational age (SGA) or twin pregnancy, while others aspire to provide information on the cause of death, focusing on specific clinical groups relevant to biomedical research questions.

AIMS AND OBJECTIVES

AIMS & OBJECTIVES

Aim:

To identify the various causes of stillbirth in the study population using ReCoDe classification

Objectives:

The objective of the study is to know the stillbirth rate and causes of stillbirth using relevant condition at death (ReCoDe) classification.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Stil Birth:

Stillbirth, defined as the birth of a baby showing no signs of life after a specific gestational age (≥20 weeks in the United States or ≥24 weeks in most other countries), is a profound public health issue. Despite significant advancements in healthcare, stillbirth remains a tragic reality for millions of families worldwide, with approximately 2 million cases occurring annually, as reported by the WHO [18]. Beyond its devastating emotional and psychological toll on parents, stillbirth reflects broader health system challenges, including inequities in maternal healthcare access and quality.

Epidemiology of Stillbirths

Globally, stillbirth rates vary widely. HICs report rates of 3–5 stillbirths per 1,000 births, attributed to better maternal healthcare services, advanced diagnostic capabilities, and routine antenatal care [19]. Conversely, LMICs face stillbirth rates exceeding 25 per 1,000 births, with sub-Saharan Africa and South Asia accounting for more than two-thirds of the global burden [20]. These disparities stem from factors such as limited access to skilled birth attendants, suboptimal antenatal care, and higher prevalence of maternal health conditions like hypertension and diabetes. To put that in perspective, that's around the same number of deaths as neonatal mortality globally and greater than under-5 child deaths in HICs[21]. The vast majority (98%) of stillbirths occur in LMICs, with sub-Saharan Africa and South Asia shouldering the heaviest burden [19].

But disparities exist even within LMICs. Rural areas tend to have higher stillbirth rates than urban areas. Socioeconomically disadvantaged populations also experience higher stillbirth rates [2]. Conflict settings, in particular, significantly increase risk, with stillbirth rates in these areas up to 10-fold higher than the global estimate [19].

HICs still face challenges too, with stillbirth rates ranging from 1.3 to 8.8 per 1,000 births [22]. In both HICs and LMICs, stigma and taboo surrounding stillbirths have led to underreporting and data gaps [23]. As we look more closely at the factors contributing to stillbirths, keep in mind how the global burden and disparities set the stage.

So what drives these high rates of stillbirth? In LMICs, major factors include limited access to quality antenatal care, skilled birth attendants, and emergency obstetric care [19]. Infections like malaria, syphilis and HIV also play a role, as do non-communicable diseases such as diabetes and hypertension [23]. Adolescent pregnancy is another key risk factor in these settings [23].

In HICs, the increasing prevalence of advanced maternal age, obesity, and multiple pregnancies from assisted reproductive technologies have contributed to stillbirths. Disadvantaged populations in HICs also face higher risks, often related to smoking, substance abuse, and limited access to care [24].

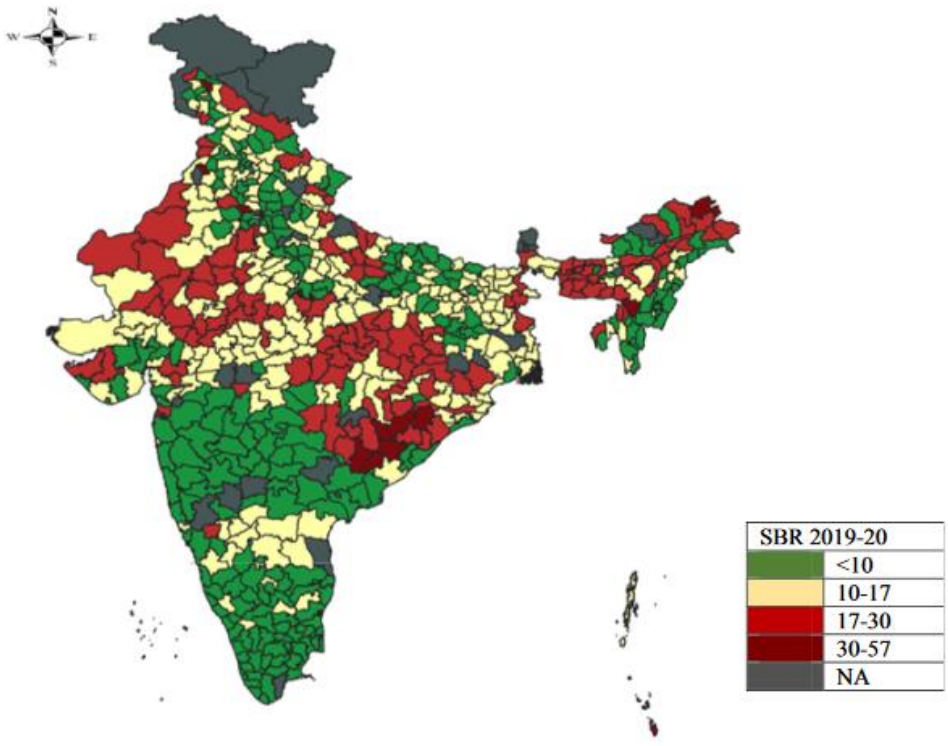


Fig. 1e: Prevalence of stillbirth rates across the districts in India, HMIS 2019–20 (Moran's *I*: 0.372).

Risk Factors for Stillbirths

1. Maternal Risk Factors

Maternal health plays a pivotal role in fetal survival. Several maternal conditions and characteristics increase the likelihood of stillbirth:

a. Hypertensive Disorders of Pregnancy

Hypertension, including preeclampsia and eclampsia, is a leading cause of stillbirth. These conditions can impair placental function, reducing oxygen and nutrient delivery to the fetus, leading to FGR and intrauterine hypoxia [18]. Chronic hypertension exacerbates these risks, especially when poorly controlled.

b. Diabetes Mellitus

Both pregestational and gestational diabetes are associated with an elevated risk of stillbirth. Poor glycemic control increases the likelihood of fetal macrosomia, stillbirth, and placental abnormalities [19]. The risk is particularly pronounced in pregnancies complicated by diabetic ketoacidosis.

c. Infections

Maternal infections, especially in LMICs, are a significant contributor to stillbirths. Infections such as syphilis, malaria, HIV, and bacterial infections like chorioamnionitis directly compromise fetal viability. For instance:

- **Syphilis** is responsible for over 200,000 stillbirths annually, primarily in LMICs [3].
- **Malaria** affects placental function and increases the risk of fetal growth restriction and stillbirth [21].

d. Obesity

Maternal obesity is linked to higher risks of gestational diabetes, hypertension, and stillbirth. Obese women often experience metabolic and vascular complications that impair placental function, leading to adverse outcomes [22].

e. Advanced Maternal Age

Pregnancy in women aged ≥35 years is associated with higher risks of chromosomal abnormalities, placental dysfunction, and complications such as preeclampsia, contributing to stillbirth [23].

f. Lifestyle Factors

- **Smoking:** Smoking during pregnancy reduces oxygen delivery to the fetus due to carbon monoxide exposure, leading to hypoxia and FGR, increasing stillbirth risk [24].
- **Alcohol and Substance Use:** Alcohol consumption and drug use during pregnancy are linked to fetal anomalies, placental insufficiency, and stillbirth.

g. Previous Pregnancy Loss

A history of prior stillbirth, miscarriage, or neonatal death is a significant predictor of recurrent stillbirth, often due to unresolved underlying maternal conditions [25].

2. Fetal Risk Factors

Certain fetal conditions directly contribute to stillbirth:

a. Congenital Anomalies and Chromosomal Abnormalities

Structural abnormalities (e.g., neural tube defects, cardiac malformations) and chromosomal disorders (e.g., trisomy 13, trisomy 18) are major causes of fetal demise. Advances in prenatal screening have improved early detection, but anomalies still account for a substantial proportion of stillbirths [26].

b. Intrauterine Growth Restriction (IUGR)

IUGR, often due to placental insufficiency, results in reduced fetal growth and increases vulnerability to hypoxia and stillbirth. Symmetrical IUGR (global growth restriction) and asymmetrical IUGR (brain-sparing growth restriction) are both associated with poor perinatal outcomes [27].

c. Fetal Infections

Vertical transmission of infections such as CMV, rubella, toxoplasmosis, and parvovirus B19 can cause severe fetal damage and intrauterine death [28].

3. Placental Risk Factors

The placenta plays a critical role in sustaining pregnancy, and its dysfunction is implicated in many stillbirths:

a. Placental Insufficiency

Placental insufficiency occurs when the placenta fails to meet the metabolic demands of the growing fetus, leading to hypoxia, growth restriction, and stillbirth. Causes include maternal hypertension, diabetes, and thrombophilic disorders [29].

b. Placental Abruption

Abruptio placentae, or premature separation of the placenta from the uterine wall, causes acute fetal hypoxia and is a leading cause of sudden stillbirth, particularly in LMICs [30].

c. Placental Infections

Infections like chorioamnionitis (bacterial infection of the amniotic sac) lead to inflammation and damage to the placenta, significantly increasing stillbirth risk [31].

d. Umbilical Cord Complications

Cord prolapse, true knots, and nuchal cord (cord wrapped around the fetal neck) can obstruct blood flow and lead to acute fetal hypoxia.

e. Placental Pathology

Abnormal placental implantation, such as placenta previa (low-lying placenta) or placenta accreta (abnormally adherent placenta), disrupts normal pregnancy progression and increases the risk of fetal demise [32].

4. Intrapartum Risk Factors

Stillbirths occurring during labor are predominantly preventable with timely and skilled care. Key intrapartum factors include:

a. Birth Asphyxia

Inadequate oxygen supply during labor, often due to prolonged labor, obstructed labor, or uterine rupture, is a major cause of intrapartum stillbirth [33].

b. Trauma During Delivery

Instruments used in assisted vaginal delivery, such as forceps or vacuum extractors, can lead to fetal injury and stillbirth if improperly applied.

c. Uterine Rupture

Rupture of a scarred uterus, often due to previous cesarean sections, is a catastrophic event leading to sudden fetal demise.

5. Socioeconomic and Health System Factors

Inequities in access to healthcare and poor health infrastructure contribute significantly to stillbirth, especially in LMICs.

a. Poverty and Illiteracy

Women from socioeconomically disadvantaged backgrounds are more likely to experience malnutrition, untreated infections, and inadequate antenatal care, all of which increase stillbirth risk [34].

b. Limited Access to Skilled Birth Attendants

The absence of trained healthcare providers during labor and delivery results in delays in managing obstetric emergencies, contributing to intrapartum stillbirths.

c. Suboptimal Antenatal Care

Lack of routine monitoring for maternal conditions such as hypertension and diabetes leads to missed opportunities for early interventions, increasing the likelihood of stillbirth [35].

6. Environmental and External Factors

Environmental and external factors also contribute to stillbirth:

a. Environmental Exposures

Exposure to environmental toxins, such as pesticides and heavy metals, during pregnancy is linked to placental dysfunction and fetal anomalies, increasing stillbirth risk [36].

b. Trauma

Maternal trauma due to accidents or physical violence can result in placental abruption, uterine rupture, or direct fetal injury.

Interplay of Multiple Risk Factors

Stillbirth often results from the interplay of multiple risk factors. For instance, maternal hypertension may lead to placental insufficiency and IUGR, both of which increase susceptibility to intrapartum hypoxia. Identifying such multifactorial risks underscores the need for comprehensive care during pregnancy.

Classification Systems for Stillbirth

Identifying the cause of stillbirth is essential for prevention, yet historically, classification systems have faced limitations. Early models such as the Wigglesworth and Aberdeen classifications focused on single causes and were criticized for leaving many stillbirths unexplained [25].

The “Relevant Condition at Death” (ReCoDe) classification system, introduced by Gardosi et al. in 2005, provides a more nuanced framework. ReCoDe emphasizes conditions present at the time of death, categorizing stillbirths into fetal, maternal,

placental, intrapartum, and external factors [20]. This approach improves the ability to identify actionable causes, with studies showing it can classify up to 90% of stillbirths.

ReCoDe Classification System

Developed by Gardosi et al. in 2005, the Relevant Condition at Death (ReCoDe) system provides a structured approach to classify stillbirths according to the most relevant condition at the time of fetal death [20]. Rather than a simple hierarchical list of causes, ReCoDe captures a narrative of the sequence of events leading to the stillbirth. This allows for a more nuanced understanding of the complex interplay of factors contributing to each death.

The system includes three key principles: 1) identify relevant conditions present at time of death, 2) determine which condition was most relevant to the death, and 3) classify stillbirths by these relevant conditions [20]. ReCoDe defines "relevant" as any condition that contributed to the death or was relevant to the cause of death, rather than simply any condition present at time of death.

ReCoDe includes nine primary classification groups, each with further subgroups allowing for more granular categorization [20].

1. Fetus: Congenital anomalies, isoimmunization, non-immune hydrops, tumors, specific fetal conditions
2. Umbilical Cord: Prolapse, constricting loop or knot, velamentous insertion, other
3. Placenta: Abruption, previa, vasa previa, placental insufficiency, other
4. Amniotic Fluid: Chorioamnionitis, oligohydramnios, polyhydramnios, other
5. Uterus: Rupture, uterine anomalies, other
6. Mother: Diabetes, thyroid diseases, essential hypertension, hypertensive diseases of pregnancy, lupus or antiphospholipid syndrome, cholestasis, drug misuse, other

7. Intrapartum: Asphyxia, birth trauma

8. Trauma: External

9. Unclassified: No relevant condition identified, no information available

Classification system according to relevant condition at death (ReCoDe)

Group A: Fetus

1. Lethal congenital anomaly
2. Infection
   2.1 Chronic
   2.2 Acute
3. Non-immune hydrops
4. Isoimmunisation
5. Fetomaternal haemorrhage
6. Twin-twin transfusion
7. Fetal growth restriction*

Group B: Umbilical cord

1. Prolapse
2. Constricting loop or knot†
3. Velamentous insertion
4. Other

Group C: Placenta

1. Abruptio
2. Praevia
3. Vasa praevia
4. Other "placental insufficiency"‡
5. Other

Group D: Amniotic fluid

1. Chorioamnionitis
2. Oligohydramniost†
3. Polyhydramniost†
4. Other

Group E: Uterus

1. Rupture
2. Uterine anomalies
3. Other

Group F: Mother

1. Diabetes
2. Thyroid diseases
3. Essential hypertension
4. Hypertensive diseases in pregnancy
5. Lupus or antiphospholipid syndrome
6. Cholestasis
7. Drug misuse
8. Other

Group G: Intrapartum

1. Asphyxia
2. Birth trauma

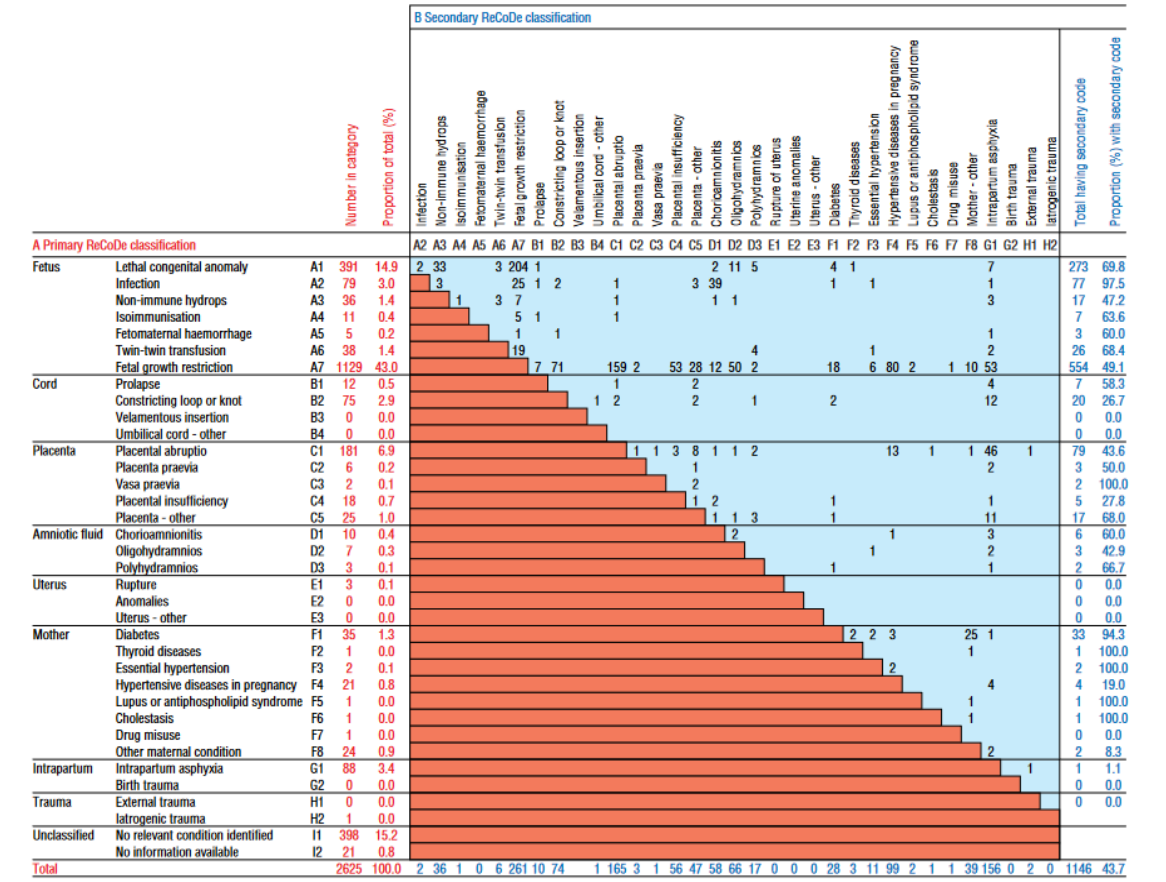
Group H: Trauma

1. External
2. Iatrogenic

Group I: Unclassified

1. No relevant condition identified
2. No information available

*$< 10^{th}$ customised weight for gestational age centile.
†If severe enough to be considered relevant.
‡Histological diagnosis.



A Primary ReCoDe classification			Number in category	Proportion of total (%)	B Secondary ReCoDe classification: Infection A2	Non-immune hydrops A3	Isoimmunisation A4	Fetomaternal haemorrhage A5	Twin-twin transfusion A6	Fetal growth restriction A7	Prolapse B1	Constricting loop or knot B2	Velamentous insertion B3	Umbilical cord - other B4	Placental abruptio C1	Placenta praevia C2	Vasa praevia C3	Placental insufficiency C4	Placenta - other C5	Chorioamnionitis D1	Oligohydramnios D2	Polyhydramnios D3	Rupture of uterus E1	Uterine anomalies E2	Uterus - other E3	Diabetes F1	Thyroid diseases F2	Essential hypertension F3	Hypertensive diseases in pregnancy F4	Lupus or antiphospholipid syndrome F5	Cholestasis F6	Drug misuse F7	Mother - other F8	Intrapartum asphyxia G1	Birth trauma G2	External trauma H1	Iatrogenic trauma H2	Total having secondary code	Proportion (%) with secondary code
Fetus	Lethal congenital anomaly	A1	391	14.9	2	33			3	204	1								2	11	5				4	1						7				273	69.8
	Infection	A2	79	3.0		3				25	1	2		1				3	39						1		1					1				77	97.5
	Non-immune hydrops	A3	36	1.4			1		3	7				1					1	1												3				17	47.2
	Isoimmunisation	A4	11	0.4						5	1			1																						7	63.6
	Fetomaternal haemorrhage	A5	5	0.2						1		1																				1				3	60.0
	Twin-twin transfusion	A6	38	1.4						19											4					1						2				26	68.4
	Fetal growth restriction	A7	1129	43.0							7	71			159	2		53	28	12	50	2			18		6	80	2		1	10	53				554	49.1
Cord	Prolapse	B1	12	0.5											1				2													4				7	58.3
	Constricting loop or knot	B2	75	2.9									1	2					2		1				2							12				20	26.7
	Velamentous insertion	B3	0	0.0																																0	0.0
	Umbilical cord - other	B4	0	0.0																																0	0.0
Placenta	Placental abruptio	C1	181	6.9												1	1	3	8	1	1	2						13		1	1	46	1			79	43.6
	Placenta praevia	C2	6	0.2															1													2				3	50.0
	Vasa praevia	C3	2	0.1															2																	2	100.0
	Placental insufficiency	C4	18	0.7															1	2					1							1				5	27.8
	Placenta - other	C5	25	1.0															1	1	3				1							11				17	68.0
Amniotic fluid	Chorioamnionitis	D1	10	0.4																2								1				3				6	60.0
	Oligohydramnios	D2	7	0.3																							1					2				3	42.9
	Polyhydramnios	D3	3	0.1																					1							1				2	66.7
Uterus	Rupture	E1	3	0.1																																0	0.0
	Anomalies	E2	0	0.0																																0	0.0
	Uterus - other	E3	0	0.0																																0	0.0
Mother	Diabetes	F1	35	1.3																						2	2	3				25	1			33	94.3
	Thyroid diseases	F2	1	0.0																												1				1	100.0
	Essential hypertension	F3	2	0.1																								2								2	100.0
	Hypertensive diseases in pregnancy	F4	21	0.8																												4				4	19.0
	Lupus or antiphospholipid syndrome	F5	1	0.0																											1					1	100.0
	Cholestasis	F6	1	0.0																												1				1	100.0
	Drug misuse	F7	1	0.0																																0	0.0
	Other maternal condition	F8	24	0.9																													2			2	8.3
Intrapartum	Intrapartum asphyxia	G1	88	3.4																														1		1	1.1
	Birth trauma	G2	0	0.0																																0	0.0
Trauma	External trauma	H1	0	0.0																																0	0.0
	Iatrogenic trauma	H2	1	0.0																																	
Unclassified	No relevant condition identified	I1	398	15.2																																	
	No information available	I2	21	0.8																																	
Total			2625	100.0	2	36	1	0	6	261	10	74	1	165	3	1	56	47	58	66	17	0	0	0	28	3	11	99	2	1	1	39	156	0	2	0	1146	43.7

Using this system, the most relevant condition at death is determined by working backwards from the point of death to identify the earliest relevant condition that ultimately led to the chain of events resulting in stillbirth [20]. This focus on the narrative sequence is a key strength of ReCoDe.

For example, consider a case of a term stillbirth where placental abruption occurs in the context of maternal hypertension. While the abruption was the ultimate cause of death, ReCoDe would identify the hypertension as the most relevant condition, as it began the chain of events that led to the abruption and subsequent stillbirth.

ReCoDe was developed through a robust process, beginning with a review of existing classification systems, then iteratively refined through application to a population-based cohort of stillbirths [20]. It has subsequently been applied in a range of settings globally. Let's examine the strengths of this approach.

Advantages of ReCoDe Classification

The ReCoDe system offers several key advantages over other approaches to stillbirth classification. First and foremost, it provides a standardized method to compare data across different populations and settings [27]. This is crucial for identifying trends, recognizing areas for improvement, and evaluating the effectiveness of interventions on a broad scale.

Secondly, ReCoDe's focus on the most relevant condition, rather than simply listing all conditions present, allows for a more nuanced understanding of the true cause of death [20]. This is important for guiding interventions to target the root causes of stillbirths. By encouraging a narrative approach that traces the sequence of events, ReCoDe provides a more complete picture of the complex interplay of factors leading to each stillbirth.

Another key strength of ReCoDe is its high interobserver agreement, with kappa values ranging from 0.65-0.85 in different studies [20,28]. This means that different clinicians applying the ReCoDe system to the same case are highly likely to reach the same determination of the most relevant condition. This reliability is crucial for ensuring the accuracy and comparability of data.

The broad categories of ReCoDe also allow for its application in a range of settings, from low-resource contexts with minimal investigation to high-resource settings with extensive testing. This flexibility has allowed ReCoDe to be applied globally, providing valuable data on stillbirth causes across very different populations [29].

For example, a study in a rural district hospital in The Gambia was able to apply ReCoDe to 137 stillbirths, despite limited access to diagnostic testing [29]. In this context, ReCoDe identified intrapartum events as the most common cause (47%), followed by maternal conditions (23%) and placental factors (15%) [29]. This study helped identify key areas for intervention, such as improving access to emergency obstetric care.

On the other end of the spectrum, a study in Italy applied ReCoDe to stillbirths in a setting with a high autopsy rate and extensive diagnostic testing . Here, ReCoDe

identified placental disorders as the most common cause (41%), followed by fetal abnormalities (25%) and umbilical cord pathologies (15%) [28]. This allowed for a more detailed understanding of specific placental and fetal pathologies contributing to stillbirths.

So in both low- and high-resource settings, ReCoDe provided valuable insights specific to the local context, while still allowing for broader comparability. This widespread applicability is a key strength of the system.

Of course, no classification system is perfect, and ReCoDe does have some limitations. It's important to understand these to use the system appropriately and interpret findings accurately.

Limitations of ReCoDe Classification

While ReCoDe offers many advantages, it's important to acknowledge its limitations. One key challenge is that accurate classification relies on the quality and completeness of data available [28]. In settings with limited resources for diagnostic testing, the ability to determine the most relevant condition may be constrained. Incomplete medical records or lack of placental pathology, for example, could lead to underestimation of certain conditions.

Another potential limitation is the inherent subjectivity in determining the most relevant condition. While ReCoDe provides clear guidelines and has demonstrated good interobserver agreement [20], there is still some room for individual interpretation, particularly in complex cases with multiple contributing factors. Consistent training and clear protocols for applying ReCoDe can help mitigate this issue.

Some have also argued that ReCoDe's broad categories may oversimplify the complex realities leading to stillbirths [20]. For example, the "placental" category includes a range of conditions from abruption to insufficiency, which may have different clinical implications and preventative strategies. However, the system does allow for more granular sub-classification within these broad categories.

It's also important to note that ReCoDe captures the most relevant condition at time of fetal death, which may not always equate to the underlying cause. For example, a fetus may die due to asphyxia related to umbilical cord prolapse, but the reason for the prolapse itself may not be evident. In this case, the cord prolapse would be identified as the most relevant condition, but the underlying cause remains unknown.

Finally, like any classification system, ReCoDe can only categorize stillbirths based on the conditions that are already known and understood. It does not inherently capture new or previously unrecognized causes of stillbirth. Ongoing research is needed to continue improving our understanding of stillbirth etiology.

Despite these limitations, ReCoDe remains a valuable tool for classifying stillbirths and has been widely applied in research and practice. Let's look at some examples of how ReCoDe has been used to advance our understanding of stillbirth.

Application of ReCoDe Classification in Research and Practice

Since its development, ReCoDe has been widely adopted in stillbirth research and clinical practice globally. Its standardized approach has allowed for comparisons of stillbirth causes across diverse settings, from high-income countries with extensive diagnostic resources to low- and middle-income countries with limited access to testing.

One key application of ReCoDe has been in identifying the leading causes of stillbirth in different populations. For example, a study in Italy found that placental disorders (41%), fetal abnormalities (25%) and umbilical cord pathologies (15%) were the most common ReCoDe classifications in a setting with high rates of autopsy and placental pathology [28].

In contrast, a study in The Gambia found that intrapartum events (47%), maternal conditions (23%) and placental factors (15%) were the leading ReCoDe categories [29]. This difference highlights the varying etiologies of stillbirths in different settings and the importance of context-specific data to guide interventions.

ReCoDe has also been used to compare stillbirth causes between different groups within populations. A study in the UK found that while placental insufficiency was

the leading cause across all groups, cord abnormalities were more common in term pregnancies while congenital anomalies were more prevalent in preterm stillbirths [31]. This information can inform differential management strategies based on gestational age.

Beyond describing causes, ReCoDe has been applied to identify risk factors for different types of stillbirths. A study in Sweden found that SGA babies were overrepresented in stillbirths classified as placental insufficiency or umbilical cord complications, while AGA babies were more likely to have stillbirths classified as infections or placental abruption [32]. This suggests that growth restriction may be an important warning sign for certain types of stillbirths.

ReCoDe has also been used to evaluate the effectiveness of interventions. A study in the Netherlands evaluated a nationwide program aimed at reducing stillbirths by increasing awareness of fetal movements. They found a reduction in stillbirths due to placental insufficiency following the intervention, suggesting the program was effective at preventing this specific cause of stillbirth [33].

In addition to research applications, ReCoDe is used in clinical audit and quality improvement initiatives. By systematically classifying stillbirths, hospitals and health systems can identify areas where care improvements are needed. For example, a high proportion of stillbirths due to intrapartum events may indicate a need for better fetal monitoring and emergency obstetric care.

ReCoDe is also used in individual case reviews to identify opportunities for improving care. By walking through the sequence of events leading to a stillbirth, care teams can identify points where different management may have altered the outcome. This reflective process is important for continually improving stillbirth prevention and care.

Strategies for Stillbirth Prevention

Preventing stillbirths requires a multifaceted approach that addresses the diverse risk factors and causes identified through ReCoDe and other research. Strategies need to

be tailored to the specific context, taking into account the leading causes of stillbirth in the population, the available resources and the existing health system infrastructure. access to quality antenatal care, particularly in low- and middle-income countries. Regular check-ups allow for early identification and management of risk factors such as hypertension, diabetes, infections, and fetal growth restriction . Integrating evidence-based interventions into antenatal care, such as low-dose aspirin for women at risk of preeclampsia, can help prevent stillbirths related to these conditions [35].

Improving intrapartum care is also crucial, as a significant proportion of stillbirths occur during labor and delivery, particularly in low-resource settings [19]. This includes ensuring access to skilled birth attendants and emergency obstetric care to manage complications such as prolonged labor, fetal distress, and placental abruption [36]. Techniques such as continuous fetal monitoring and timely cesarean sections when indicated can help prevent intrapartum stillbirths [37].

Identifying and managing high-risk pregnancies is another important strategy. ReCoDe can help inform which conditions carry the highest risk in a given setting. For example, in populations with a high prevalence of fetal growth restriction, implementing protocols for regular growth monitoring and timely delivery when needed can prevent stillbirths [38]. Similarly, in settings with high rates of umbilical cord accidents, strategies such as screening for cord abnormalities and managing accordingly can be impactful [39].

Preventing and managing maternal conditions is also key. This includes lifestyle interventions such as smoking cessation and weight management, as well as medical management of conditions like diabetes, hypertension, and thyroid disorders [24]. Screening and treatment for infections like syphilis, malaria, and HIV can prevent stillbirths related to these conditions, particularly in high-prevalence areas [40].

Public health interventions also play a role. Fortifying foods with folic acid has been shown to reduce neural tube defects, a major cause of stillbirths related to congenital anomalies [41]. Improving nutrition and addressing micronutrient deficiencies, such as iron and iodine, can also improve fetal outcomes [42]. Policies to reduce

environmental exposures, such as air pollution and toxic chemicals, may also help prevent stillbirths [43].

Raising awareness and reducing stigma around stillbirths is another important aspect of prevention. Many parents are not aware of the risk factors and warning signs for stillbirth, such as reduced fetal movements [44]. Educating women and families about these signs and when to seek care can help prevent some stillbirths. Reducing stigma and blame associated with stillbirths is also crucial for encouraging open discussion and care-seeking [45].

Advancing research is also key to stillbirth prevention. While ReCoDe has greatly improved our understanding of stillbirth causes, there are still many cases where the reason for the death is unknown. Continued research into the underlying mechanisms of stillbirth, as well as the effectiveness of different interventions, is needed to drive further reductions in stillbirth rates [46].

Implementing these strategies requires a coordinated effort across different sectors and levels of the health system. It involves policymakers prioritizing stillbirth prevention, allocating resources, and creating enabling environments. It requires health systems to integrate evidence-based interventions into routine care, train healthcare providers, and strengthen referral pathways. It needs communities to be engaged and empowered to seek care and address social determinants of health.

Ultimately, the goal is for every pregnancy to end in a live, healthy birth. While we have made progress in reducing stillbirth rates globally, much work remains. By using tools like ReCoDe to understand the causes of stillbirths in different contexts, and by implementing comprehensive prevention strategies, we can work towards a future where no family has to experience the devastating loss of a stillbirth.

Recent studies related to ReCoDe:

Agarwal V and Agarwal N (2023) conducted a hospital-based retrospective study to evaluate the stillbirth rate and identify the causes of stillbirth using the Relevant Condition at Death (ReCoDe) classification system. This study included a total of 4520 deliveries, among which 78 were stillbirths, resulting in a stillbirth rate of 17.2

per 1000 births. The analysis revealed that maternal factors, such as pregnancy-induced hypertension (PIH), preeclampsia, and eclampsia, along with undiagnosed congenital anomalies, were significantly more prevalent in un-booked mothers compared to booked cases. The ReCoDe classification was able to assign causes to 88% of the stillbirths, demonstrating its effectiveness in identifying contributing conditions. Among the maternal causes, PIH and antepartum hemorrhage were the most frequently observed. In terms of fetal causes, severe growth restriction and lethal congenital anomalies were predominant. Additionally, medical conditions associated with stillbirths were identified in 41.2% (32) of the mothers included in the study.[47]

Similarly, Kashif U et al. (2022) conducted a retrospective cross-sectional study to determine the causes of stillbirth using the ReCoDe classification system. The study included 207 women diagnosed with stillbirth after 24 weeks of pregnancy at the Aga Khan University Hospital (AKUH) in Karachi. During the study period, there were 32413 live births and 207 stillbirths, yielding a stillbirth rate of 6 per 1000 live births. The study examined the demographic and clinical characteristics of the participants. Among the women, 80% were aged 20–35 years, while 16% had advanced maternal age (over 35 years), and 3.8% were younger than 20 years. The analysis of maternal booking status showed that 54.5% of the cases were booked, while the remaining 45.5% were un-booked. Pre-eclampsia emerged as the most common maternal condition, affecting 14.9% of the participants. Fetal causes were identified in 34.7% of the stillbirths, with fetal growth restriction (FGR) being the leading cause, observed in 23.6% of cases. The ReCoDe classification system successfully identified associated conditions in 81% of the stillbirth cases, leaving only 18.8% categorized as unexplained. This study highlighted the significance of maternal and fetal factors in stillbirth etiology and underscored the utility of the ReCoDe system in providing a structured approach to determining causes of stillbirth.[48]

Changede P et al. (2022) conducted an observational study to examine the causes of stillbirth and classify them into maternal, fetal, and placental categories using the Relevant Condition at Death (ReCoDe) classification. The research aimed to understand demographic factors contributing to stillbirths and identify actionable areas for intervention to reduce perinatal mortality. The study was conducted over a

year at a tertiary care center in Mumbai, India. Data included maternal demographics and causes of stillbirths, categorized into maternal, fetal, and placental causes per the ReCoDe classification. Among 9074 deliveries during the study period, 275 resulted in stillbirths, yielding a stillbirth rate (SBR) of 30.3 per 1000 total births. The majority of mothers (32.7%) were aged 26–30 years, with 98.5% residing in urban areas. According to the modified Kuppuswamy classification, 71.79% of participants belonged to the upper-lower socioeconomic class. Approximately 31.2% were primigravidae, and 54.8% had attended three or more antenatal visits. Maternal conditions, including pre-eclampsia, diabetes, and pre-existing medical disorders, were the leading causes of stillbirths, accounting for 42% of cases, either directly or as contributing factors. Antepartum stillbirths constituted 78% of the cases. The study also noted that 65% of subjects were referred from peripheral hospitals, and 58.9% of stillborns were macerated. Male stillbirths were slightly more common (53.8%). The ReCoDe classification identified hypertensive disorders in pregnancy as the most frequent cause of stillbirths (76 cases), followed by fetal growth restriction (30 cases).[49]

Kulkarni N et al. (2019) undertook a study to determine the stillbirth rate in 2017 at Christian Medical College, a tertiary care perinatal center in South India, and to classify the causes of stillbirth using the ReCoDe system. The study reviewed 14,696 deliveries between January 1 and December 31, 2017, which included 247 stillbirths, giving a stillbirth rate of 16.8 per 1000 births. Regarding maternal factors, 64.2% of the women were booked, and 35.8% were un-booked. Hypertensive disorders of pregnancy were observed in 27.5% of cases, with gestational hypertension being more common among un-booked mothers compared to booked mothers (41% vs. 24%, $p = 0.005$). Lethal congenital anomalies accounted for 18.2% of stillbirths and were more frequently diagnosed in booked patients (24.7% vs. 2.3%, $p = 0.001$). Obstetric factors included previous miscarriages in 29.5% of cases and prior stillbirths in 6.9% of cases. The ReCoDe classification successfully categorized 84.2% of the stillbirths, leaving 15.78% unclassified. Fetal growth restriction due to uteroplacental insufficiency was identified in 25.9% of cases, while placental abruption accounted for 10.9%. Medical comorbidities were noted in 46.5% of pregnancies.[50]

Lu JR et al. (2009) conducted a study to evaluate the proportion of stillbirths classified as "unexplained" using the ReCoDe classification system compared to the PSANZ-PDC system. The study applied the ReCoDe classification to the National Women's Health stillbirth database for the years 2004–2007. The proportion of stillbirths classified as unexplained was significantly lower with the ReCoDe system (8.5%, n = 26) compared to the PSANZ-PDC system (14.1%, n = 43; p = 0.04). The ReCoDe system also attributed a higher proportion of stillbirths to fetal growth restriction (23.2%, n = 71) compared to the PSANZ-PDC system (8.2%, n = 25; p < 0.0001). Moreover, 44.8% (n = 137) of all stillbirths were classified as small for gestational age (birthweight < 10th customized centile). Both systems identified congenital abnormalities as the most common primary cause or condition at death.[51]

MATERIALS AND METHODS

MATERIAL AND METHODS

Study design: Case-Control design: hospital based study

Study Place: Santosh Medical College and Hospital, Ghaziabad

Minimum Sample Size Required: 150 [50 cases and 100 controls]

Sampling Frame:

Cases included all stillbirths that occurred at Santosh Hospital during the study period.

Controls were uncomplicated, term, appropriate-for-gestational-age (AGA), live births that occurred on the same day as the corresponding case. For each case, two controls were selected.

Used Formula: $n = [DEFF*Np(1-p)]/ [(d^2/Z^2_{1-\alpha/2}*(N-1)+p*(1-p)]$

Ethical Clearance: Ethical clearance was taken from the ethical committee at Santosh Medical College and Hospital, Ghaziabad.

Inclusion Criteria:

All the women who were deliver in the study hospital and had stillbirth were included in this study.

Exclusion Criteria:

The mothers who were have stillbirth, but their hospital records are incomplete, unclearly written, or incomprehensibly written.

METHOD OF DATA COLLECTION

 Permission was obtained from all subjects prior to the commencement of the study. Informed consent was taken from the pregnant patient and her caretaker.

 Bivariate analysis was conducted to examine the association between various maternal and fetal factors in both case and control groups. The following variables were analyzed:

- Classification of stillbirth as antepartum or intrapartum
- Mode of delivery, including hospital-based caesarean section or normal vaginal delivery
- Home deliveries, categorized based on whether they were conducted by skilled health personnel or untrained individuals
- Maternal age, specifically those aged below 18 years and above 35 years
- BMI, particularly cases with BMI below normal (<18.5 kg/m^2)
- Maternal anemia and iron-folic acid (IFA) tablet consumption for 100 days or more
- Antenatal care initiation in the first trimester
- Completion of at least four antenatal check-up (ANC) visits
- Presence of hypertensive disorders, including eclampsia
- Occurrence of antepartum and intrapartum hemorrhage
- Abnormal fetal presentations
- Incidence of obstructed labour

STATISTICAL ANALYSIS:

The data were initially checked for completeness, and data was cleaned for errors and missing values. The corrected data was then entered into Microsoft Excel after preparing a Master-chart. Data analysis was done using licensed SPSS software version 24.0 (Chicago, Illinois). Univariate analyses was done initially and the results were presented with the help of tables,. Descriptive statistics were used to calculate frequencies of categorical variables, and measures of central tendencies and dispersion were used to describe continuous variables. dependent t-test and Anova test were used to compare the continuous variable and chi-square test was used for categorical variables. A p-value <0.05 was considered as statistically significant.

ETHICAL ISSUES:

Approval from Institutional Ethical Committee of the hospital was taken before the start of the study. Written and informed consent taken from the participants before proceeding the study. Each eligible subject was explained about the purpose of the study by the investigator and an informed consent was obtained, prior to inclusion. They were assured of complete confidentiality of information, and the option of withdrawing from the study at any point of time. The study did not involve any method that puts the subjects, family members or the investigator at risk.

OBSERVATIONS & RESULTS

OBSERVATIONS AND RESULTS

Table 1: Age (in years) distribution of study participants

Group	Mean	SD	Median	Minimum	Maximum	p-value
Case	26.412	2.7508	26.000	21.0	33.0	0.790
Control	26.580	4.0432	27.000	8.0	34.0	
Total	26.523	3.6494	26.000	8.0	34.0	

The mean age of the participants in the case group was 26.41 ± 2.75 years and in the control group was 26.58 ± 4.04 years. The age range spanned from 8 to 34 years, and the difference between the two groups was not statistically significant (p = 0.790).

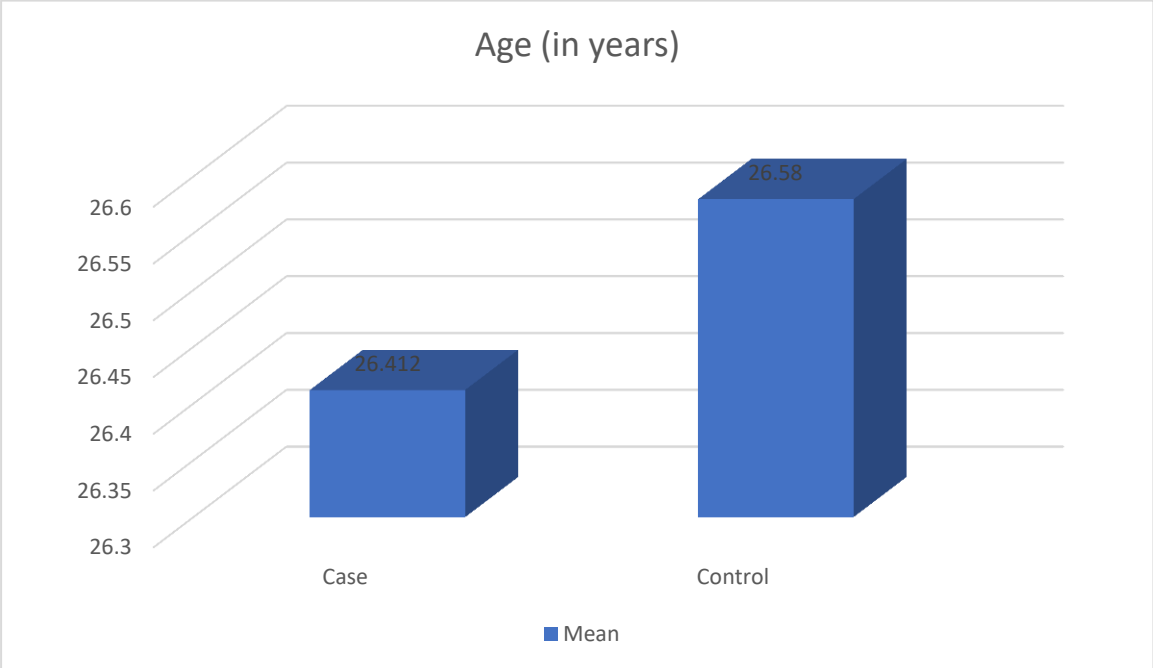


Table 2: Distribution of participants according to age among all groups

Age	Case		Control		p-value
	n	%	n	%	
≤ 25 year	18	36.0%	32	32.0%	0.222
26-30 years	30	60.0%	55	55.0%	
>30 years	2	4.0%	13	13.0%	
Total	50	100.0%	100	100.0%	

Most participants in both groups were in the 26–30 years age group (60.0% cases and 55.0% controls). A small proportion were above 30 years (4.0% cases and 13.0% controls). The age distribution difference was not statistically significant (p = 0.222).

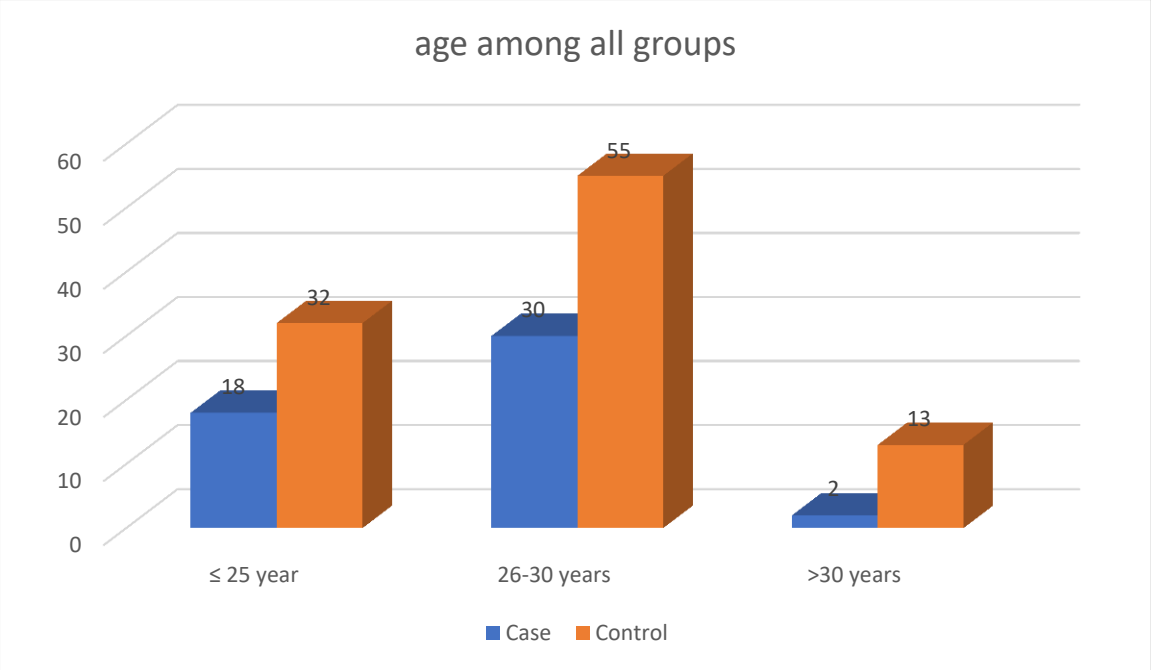


Table 3: Distribution of participants according to residence among both groups

Residence	Case		Control		p-value
	n	%	n	%	
Rural	3	6.0%	6	6.0%	1.000
Urban	47	94.0%	94	94.0%	
Total	50	100.0%	100	100.0%	

A large majority of participants in both groups were from urban areas (94.0%), with only 6.0% residing in rural areas. The distribution was identical between groups (p = 1.000).

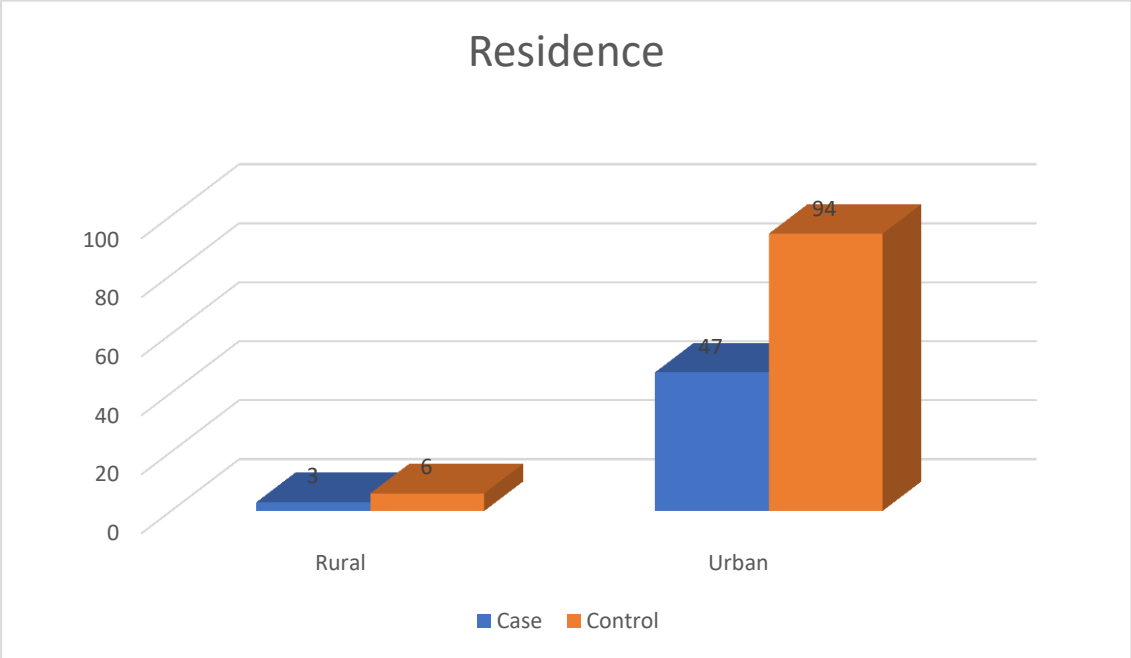


Table 4: Distribution of participants according to gravida among both groups

Gravida	Case		Control		p-value
	n	%	n	%	
Multi	29	58.0%	61	61.0%	0.724
Primi	21	42.0%	39	39.0%	
Total	50	100.0%	100	100.0%	

In the case group, 58.0% were multigravida compared to 61.0% in the control group, while the rest were primigravida. This difference was not statistically significant (p = 0.724).

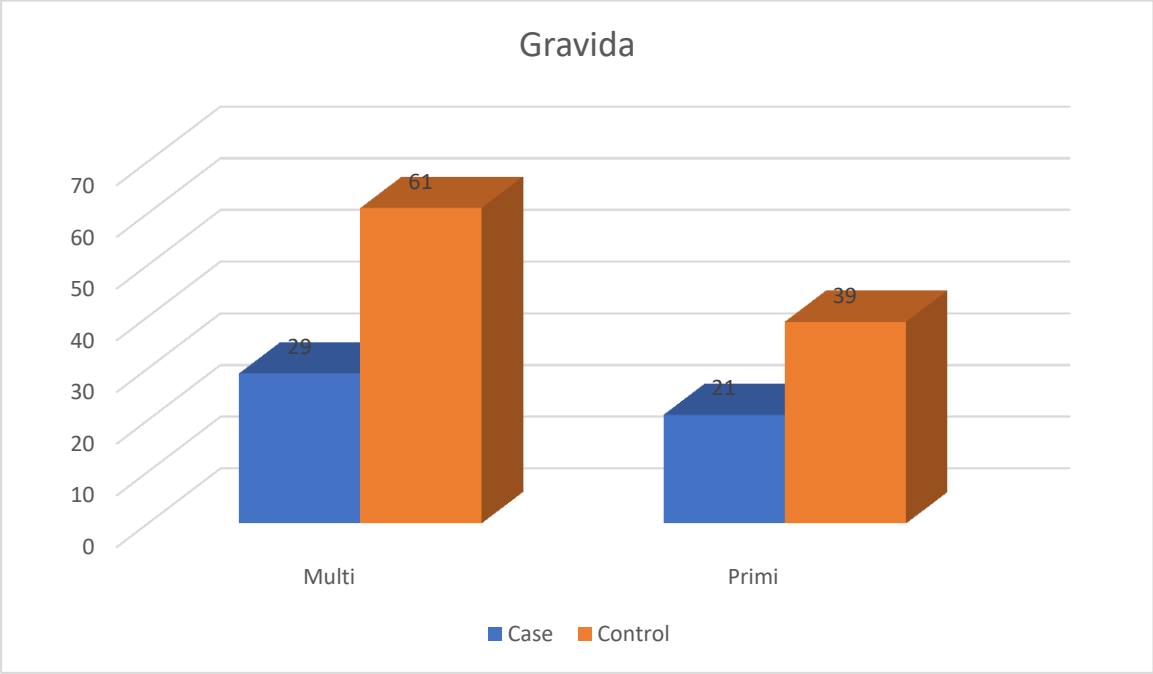


Table 5: POG (weeks) distribution of study participants

Group	Mean	SD	Median	Minimum	Maximum	p-value
Case	37.080	2.2932	37.000	30.0	40.0	0.273
Control	37.500	2.1579	38.000	30.0	40.0	
Total	37.360	2.2052	38.000	30.0	40.0	

The mean period of gestation was 37.08 ± 2.29 weeks in the case group and 37.50 ± 2.16 weeks in the control group. The difference was not statistically significant (p = 0.273).

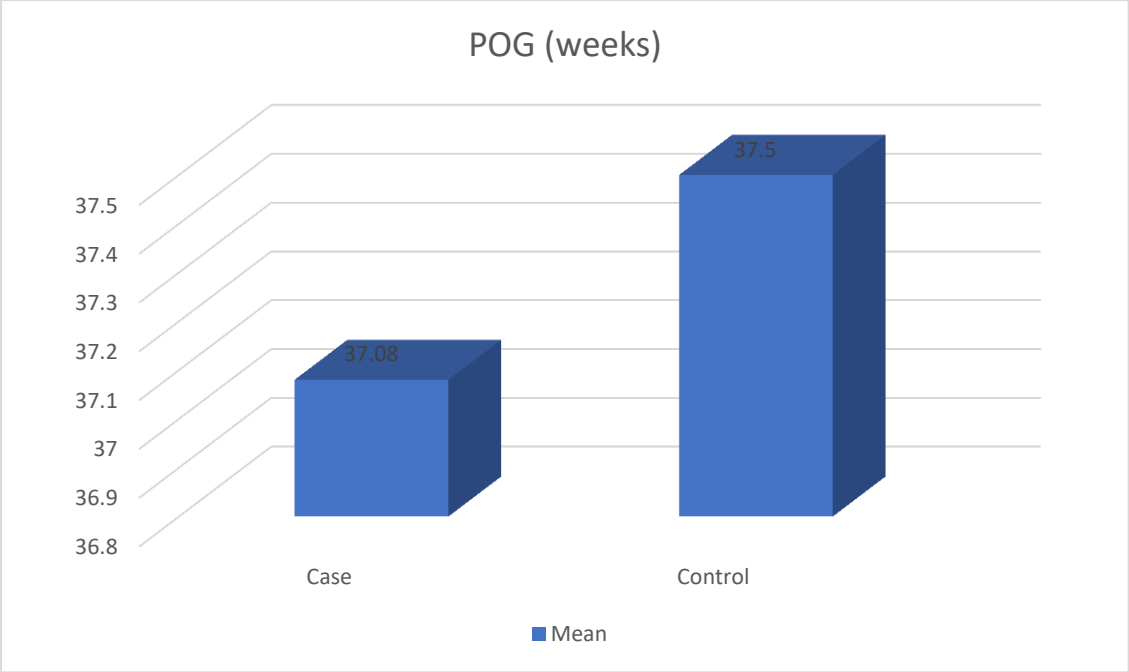


Table 6: Distribution of participants according to induction of labour among both groups

Induction	Case		Control		p-value
	n	%	n	%	
No	42	84.0%	82	82.0%	0.760
Yes	8	16.0%	18	18.0%	
Total	50	100.0%	100	100.0%	

Labour was induced in 16.0% of cases and 18.0% of controls. The majority underwent spontaneous labour. The difference was not significant (p = 0.760).

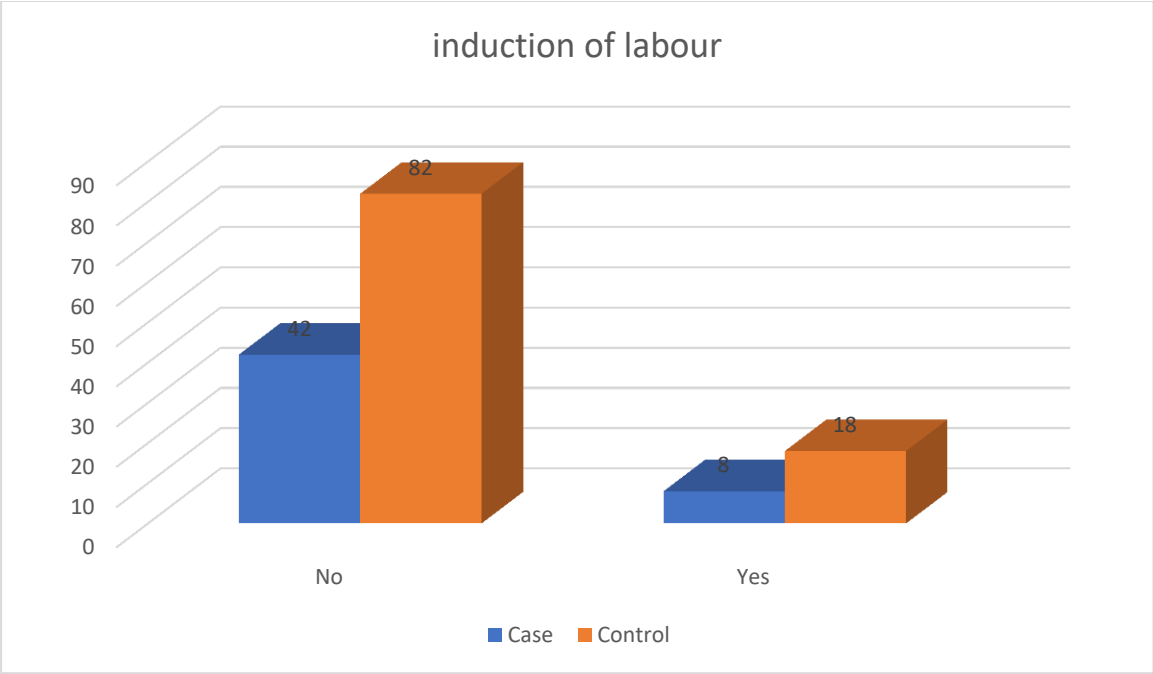


Table 7: Distribution of participants according to mode of delivery among both groups

MOD	Case		Control		p-value
	n	%	n	%	
LSCS	18	36.0%	33	33.0%	0.715
Vaginal	32	64.0%	67	67.0%	
Total	50	100.0%	100	100.0%	

Vaginal delivery occurred in 64.0% of cases and 67.0% of controls, while LSCS was performed in 36.0% of cases and 33.0% of controls. The difference was not statistically significant (p = 0.715).

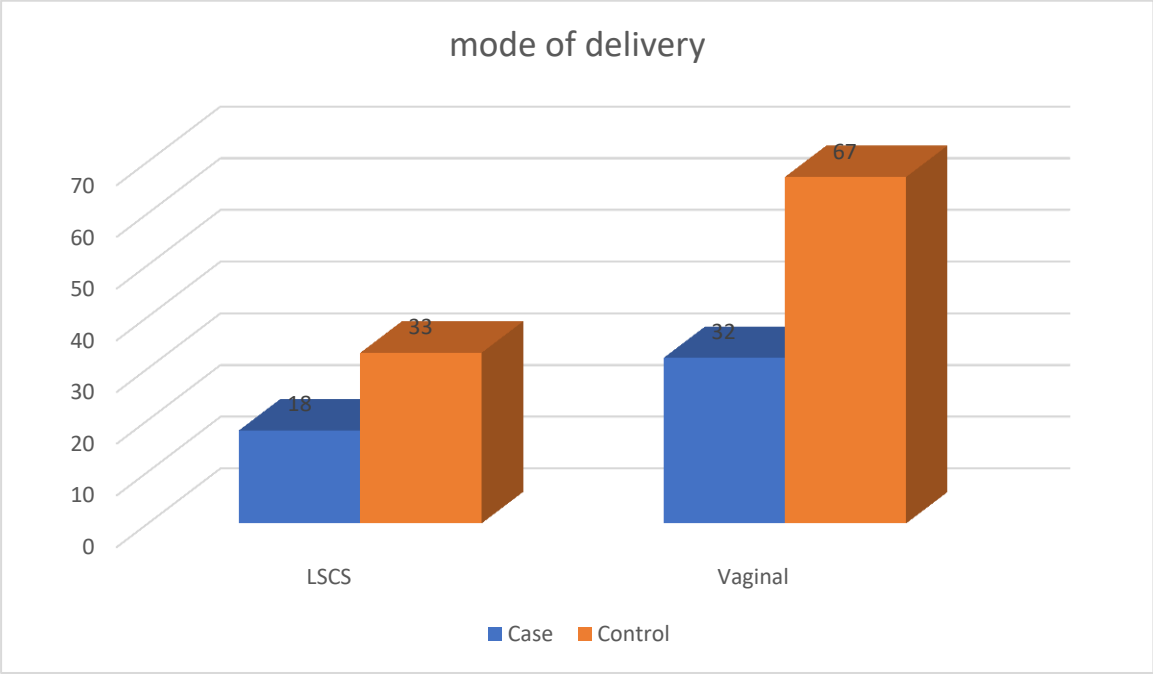


Table 8: Distribution of participants according to history among both groups

History	Case		Control		p-value
	n	%	n	%	
Prior miscarriage	13	26.0%	17	17.0%	0.001
Previous LSCS	10	20.0%	7	7.0%	0.001
Essential HTN	11	22.0%	4	4.0%	0.001
PIH	12	24.0%	10	10.0%	0.001
Meconium stained liquor	7	14.0%	3	3.0%	0.001
Meconium stained liquor with 2 loops of cord around neck	4	8.0%	3	3.0%	0.201
Anaemia	12	24.0%	13	13.0%	0.0001
ARDS and on Ventilator	4	8.0%	1	1.0%	0.023
Bleeding per vaginum	5	10.0%	4	4.0%	0.107
Breech delivery	4	8.0%	2	2.0%	0.078
DCDA Twin with	3	6.0%	4	4.0%	0.309

HBsAg+ with Anaemia					
Tachycardia with scar tenderness	4	8.0%	3	3.0%	0.201
Thrombocytopenia	2	2.0%	0	0.0%	0.222
Transverse lie with hand prolapse	3	3.0%	1	1.0%	0.198
Still birth	50	100.0%	0	0.0%	0.0001

Several maternal complications such as prior miscarriage (p = 0.001), previous LSCS (p = 0.001), essential hypertension (p = 0.001), PIH (p = 0.001), anaemia (p = 0.0001), ARDS (p = 0.023), and others were significantly more common in the case group. Stillbirth was observed in 100% of cases and none of the controls (p = 0.0001).

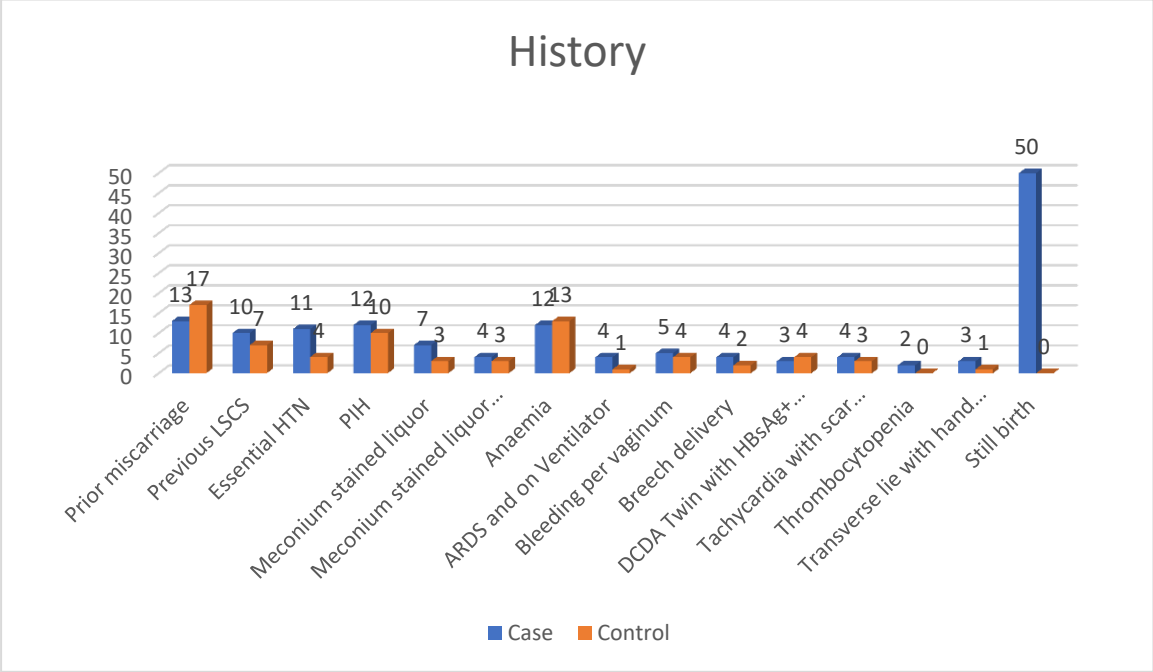


Table 9: Distribution of participants according to feteus cause (A)among both groups:

	Case		Control		p-value
	n	%	n	%	
A1	0	0	0	0	NA
A2	0	0	0	0	NA
A3	0	0	0	0	NA
A4	0	0	0	0	NA
A5	1	2.0	0	0	NA
A6	4	8.0%	2	2.0%	0.528
A7	5	10.0%	3	3.0%	0.025

Fetal causes A5 (2.0%), A6 (8.0%), and A7 (10.0%) were observed in the case group, with only A6 (2.0%) and A7 (3.0%) reported in controls. A7 showed a statistically significant difference (p = 0.025).

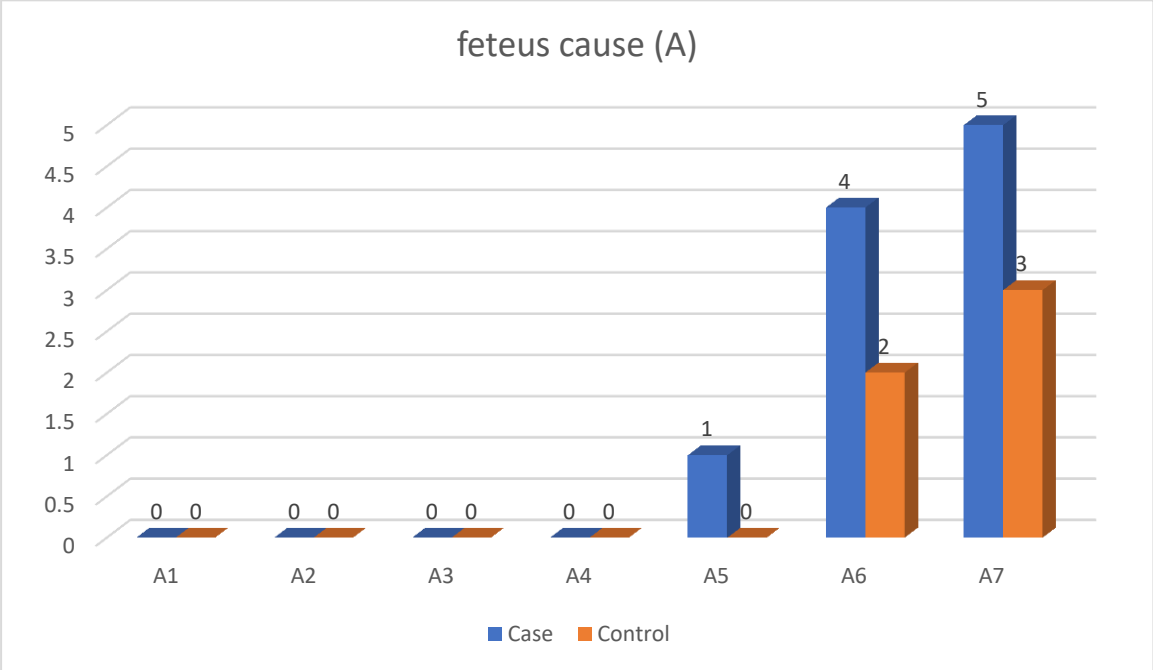


Table 10: Distribution of participants according to cord cause (A)among both groups

	Case		Control		p-value
	n	%	n	%	
B1	0	0	0	0	NA
B2	7	14.0%	3	3.0%	0.001
B3	0	0	0	0	NA

Cord-related cause B2 was significantly higher in the case group (14.0%) compared to controls (3.0%) with p = 0.001.

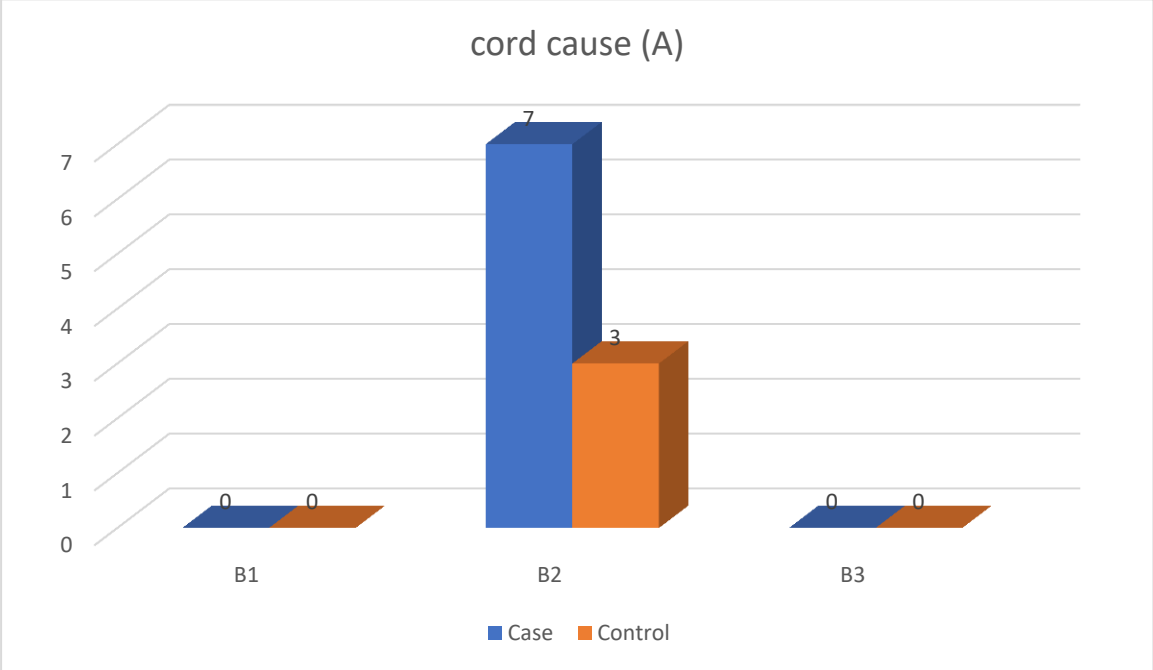


Table 11: Distribution of participants according to placenta (C)among both groups

	Case		Control		p-value
	n	%	n	%	
C1	5	10.0%	2	2.0%	0.037
C2	8	16.0%	6	6.0%	0.001
C3	0	0	0	0	NA
C4	0	0	0	0	NA
C5	0	0	0	0	NA

Placental causes C1 and C2 were significantly more frequent in the case group (10.0% and 16.0%) compared to controls (2.0% and 6.0%) with p = 0.037 and 0.001 respectively.

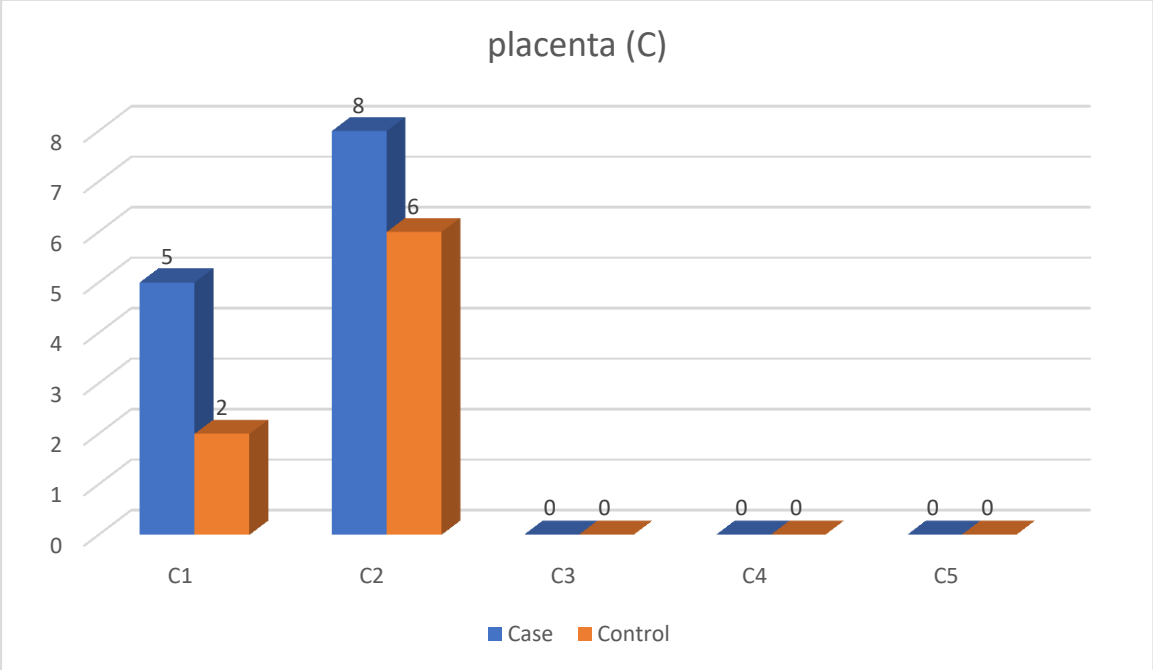


Table 12: Distribution of participants according to Amniotic fluid (D) among both groups

	Case		Control		p-value
	n	%	N	%	
D1	0	0	0	0	NA
D2	6	12.0%	8	8.0%	0.102
D3	0	0	0	0	NA
D4	7	14.0%	12	12.0%	0.728

Amniotic fluid-related causes such as D2 (12.0%) and D4 (14.0%) were observed in both groups, with no statistically significant difference.

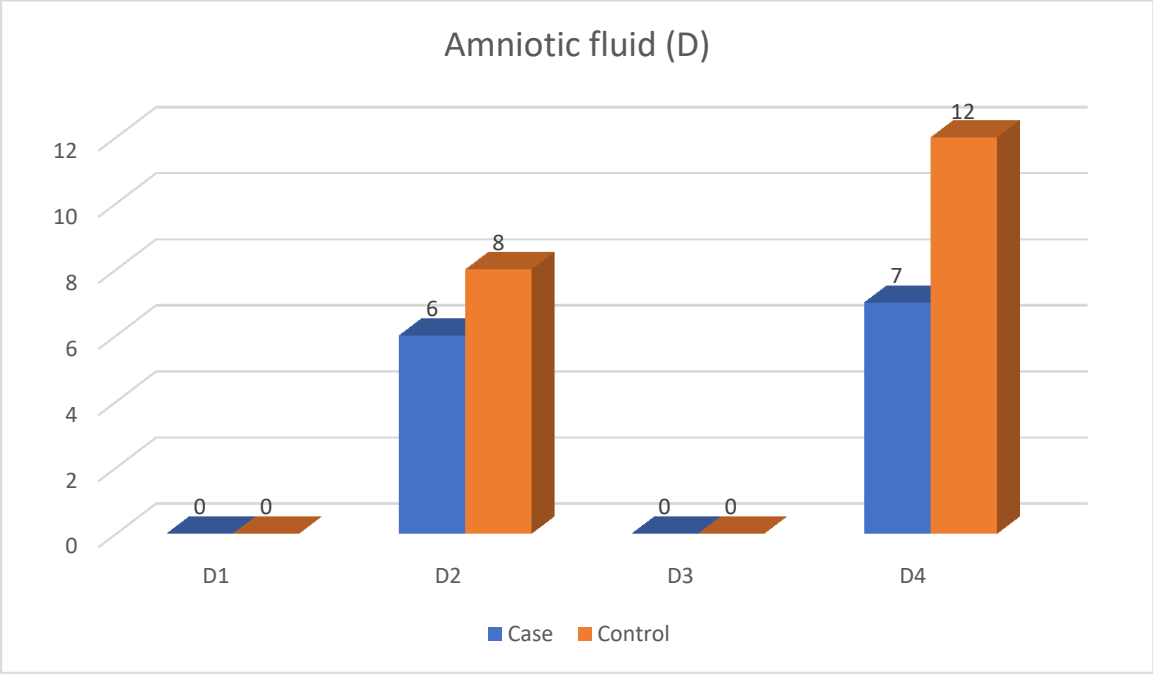


Table 13: Distribution of participants according to Uterus (E)among both groups

	Case		Control		p-value
	n	%	n	%	
E1	0	0	0	0	NA
E2	0	0	0	0	NA
E3	0	0	0	0	NA

No uterine-related causes (E1–E3) were reported in either group.

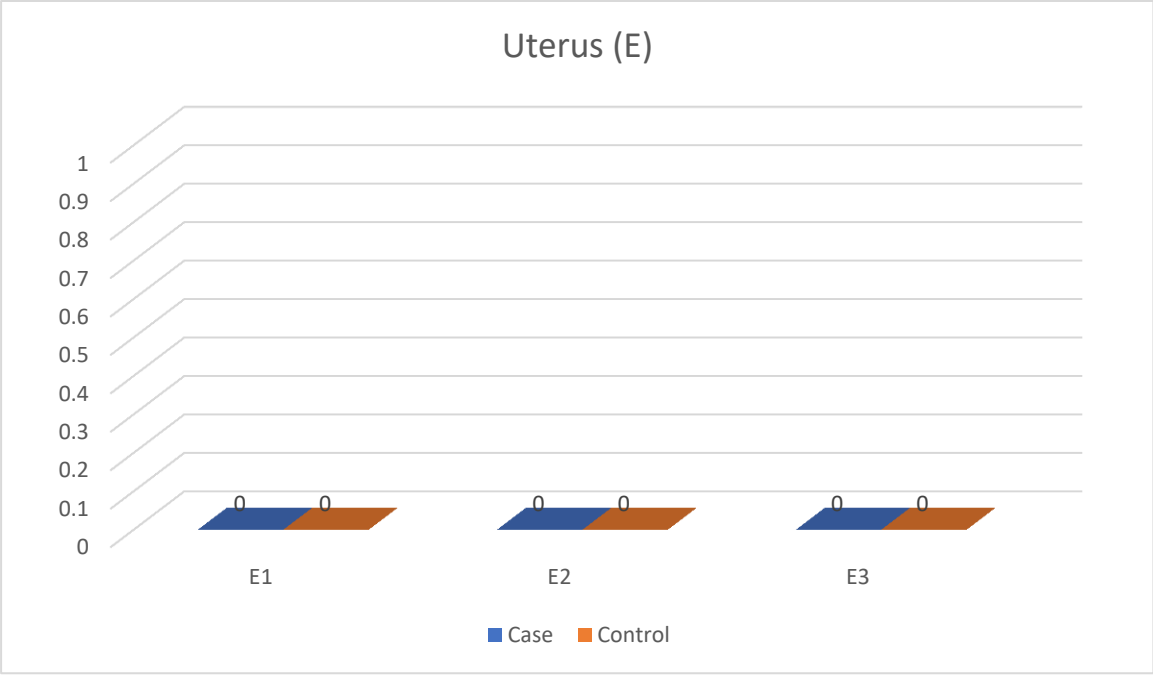


Table 14: Distribution of participants according to Mother (F) among both groups

	Case		Control		p-value
	n	%	n	%	
F1	4	8.0	0	0	0.001
F2	4	8.0	1	1.0	0.042
F3	6	12.0%	0	0.0%	0.001
F4	16	32.0%	10	10.0%	0.001
F5	0	0	0	0	NA
F6	0	0	0	0	NA
F7	0	0	0	0	NA
Anaemia	5	10.0%	8	8.0%	0.443
Bleeding per vaginum	2	4.0%	4	4.0%	1.000
DCDA twin with HBsAg+ with Anaemia	2	4.0%	4	4.0%	1.000
Fever	2	4.0%	7	7.0%	0.562

Maternal causes such as F1 (8.0%), F2 (8.0%), F3 (12.0%), and F4 (32.0%) were significantly higher among cases than controls, with p-values ranging from 0.001 to 0.042. Additional conditions like anaemia and fever were seen in both groups without significant differences.

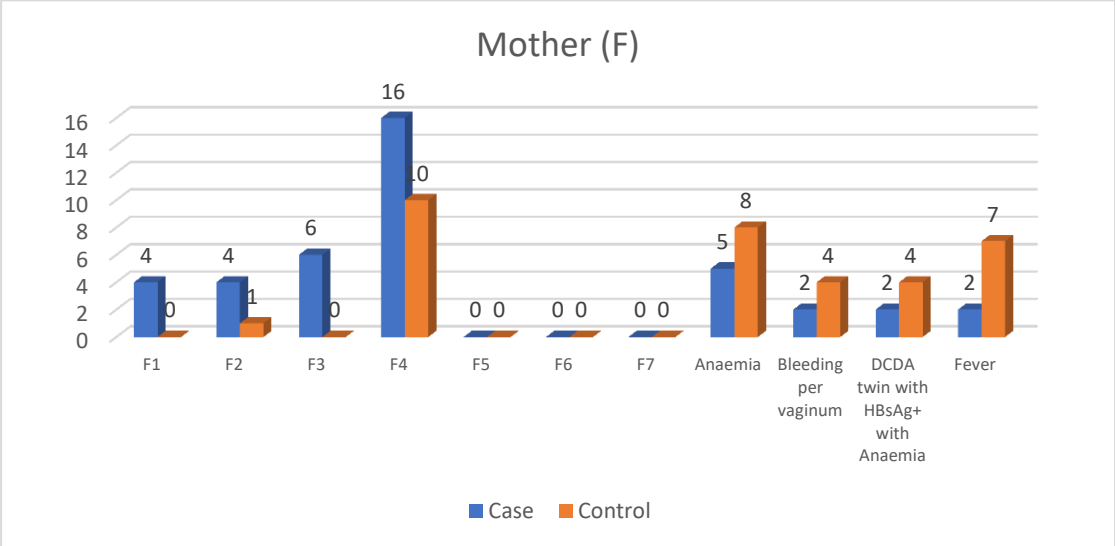


Table 15: Distribution of participants according to Intrapartum (G) among both groups

	Case		Control		p-value
	n	%	n	%	
G1	17	34.0%	12	12.0%	0.001
G2	0	0	0	0	NA

Intrapartum cause G1 was significantly more common in the case group (34.0%) compared to the control group (12.0%) (p = 0.001). G2 was absent in both groups.

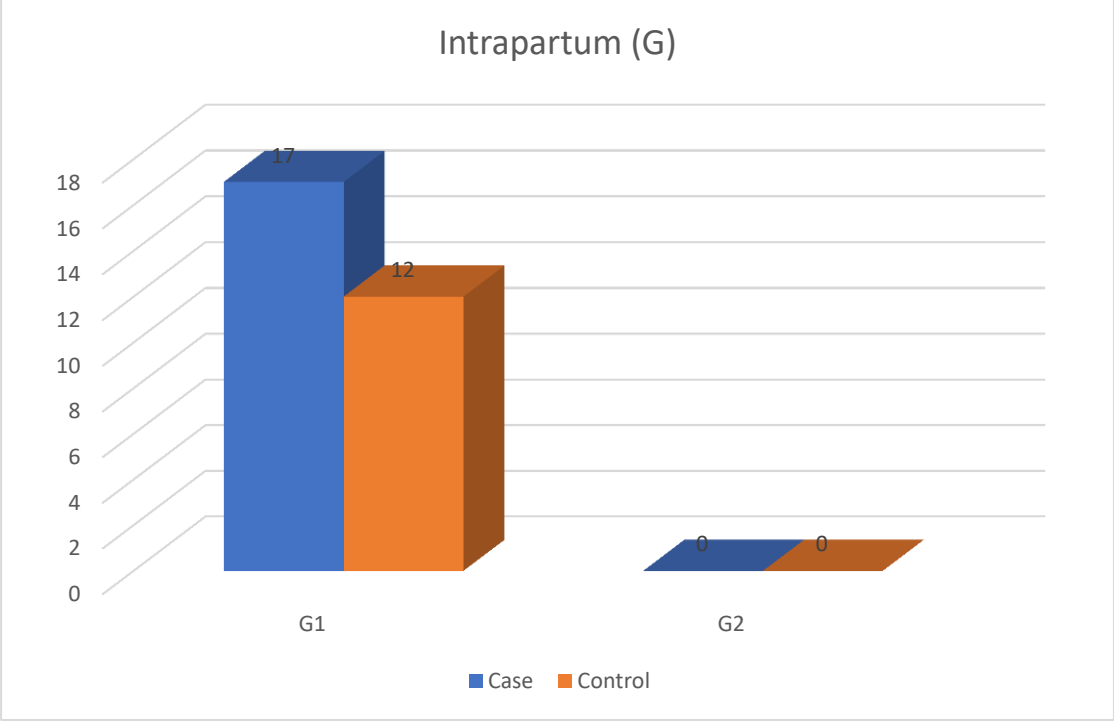


Table 16: Distribution of participants according to Trauma (H) among both groups

	Case		Control		p-value
	n	%	N	%	
H1	0	0	0	0	NA
H2	0	0	0	0	NA

No trauma-related causes were identified in either group.

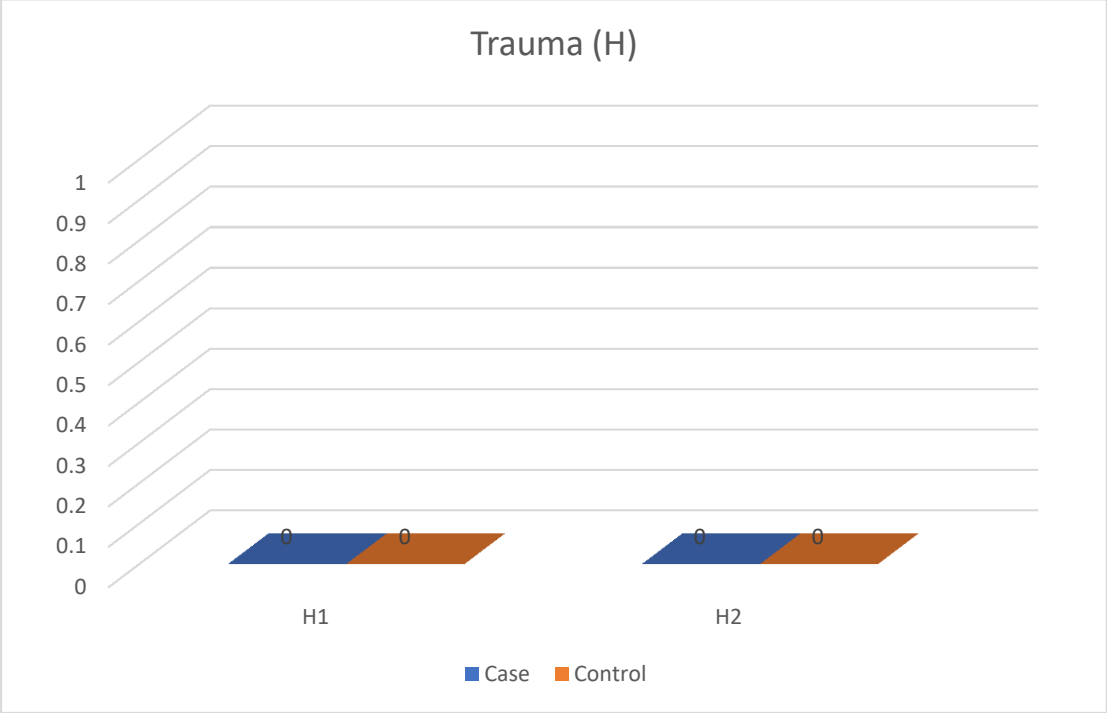
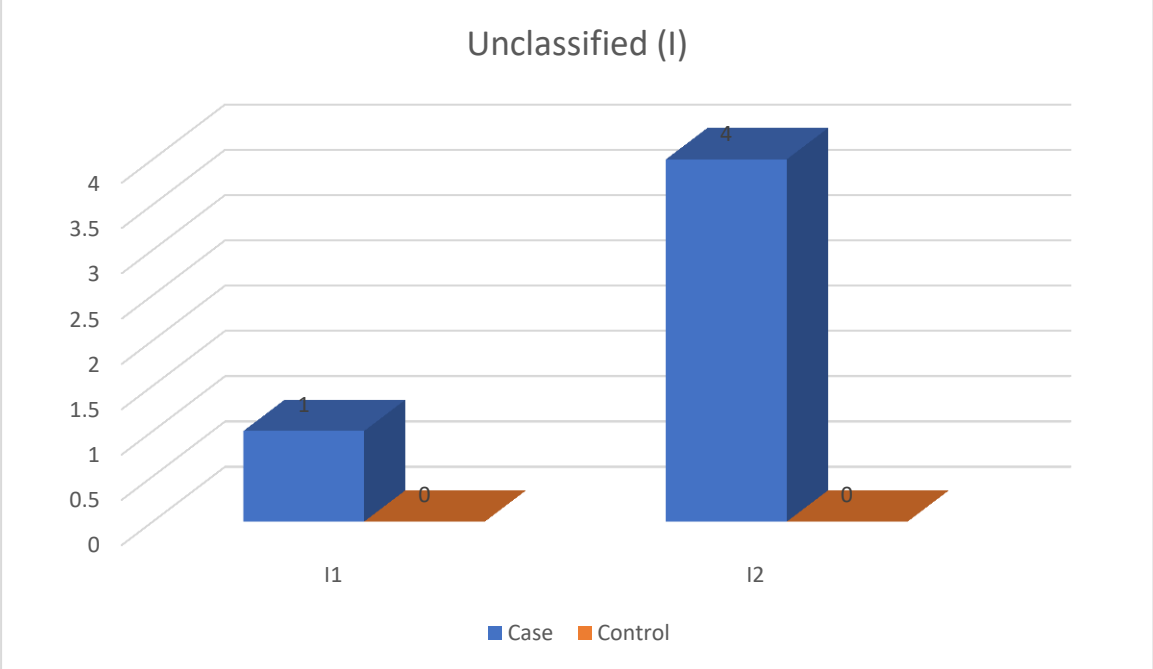


Table 17: Distribution of participants according to Unclassified (I) among both groups

	Case		Control		p-value
	n	%	N	%	
I1	1	2.0%	0	0	NA
I2	4	8.0%	0	0	NA

Unclassified causes I1 (2.0%) and I2 (8.0%) were reported only in the case group, not in controls. These were not statistically tested due to their rare occurrence.



DISCUSSION

DISCUSSION

Demographic Profile:

Our case-control study examined 50 cases of stillbirths matched with 100 controls to identify the various causes using the ReCoDe classification system. The demographic profile of our study population revealed that the mean age of participants in the case group was 26.41 ± 2.75 years, comparable to the control group at 26.58 ± 4.04 years, with no statistically significant difference (p = 0.790). Most participants in both groups (60.0% of cases and 55.0% of controls) fell within the 26-30 years age category. Only a small proportion were above 30 years (4.0% of cases and 13.0% of controls).

These age demographics align with findings from several other studies using the ReCoDe classification. Kashif U et al. (2022) [48] reported that 80% of women with stillbirths in their study were between 20-35 years, which encompasses our predominant age group. Changede P et al. (2022)[49] similarly found that the majority of mothers experiencing stillbirths (32.7%) were aged 26-30 years, which closely matches our findings. This consistency across different studies suggests that reproductive-age women in their mid-to-late twenties represent the largest demographic experiencing stillbirths, likely reflecting the general childbearing population.

Our study population was predominantly urban (94.0% in both groups), which differs somewhat from the usual demographic distribution in India. This urban predominance might reflect the catchment area of our hospital-based study and potential referral patterns. Changede P et al. (2022)[49] also reported a high urban residence rate of 98.5% among their stillbirth cases, which is similar to our findings. This urban predominance in both studies may influence interpretations regarding access to care and socioeconomic factors associated with stillbirths.

Regarding obstetric history, our study found that 58.0% of cases and 61.0% of controls were multigravida, with no significant difference between groups (p = 0.724). This finding differs slightly from Changede P et al. (2022)[49], who reported

that approximately 31.2% of their stillbirth cases were primigravidae, suggesting a higher proportion of first pregnancies in their stillbirth population than in ours. This variation might reflect differences in population characteristics or risk factors specific to particular settings.

The mean gestational age in our study was 37.08 ± 2.29 weeks for cases and 37.50 ± 2.16 weeks for controls, with no significant difference ($p = 0.273$). This indicates that most stillbirths in our study occurred at term or late preterm, which has important implications for preventive strategies. Unfortunately, the comparative studies did not provide specific details about the gestational age distribution of stillbirths, limiting direct comparisons for this parameter.

The remarkably similar demographic profiles between our case and control groups strengthen the validity of our findings regarding the specific causes of stillbirth, as they minimize potential confounding by these basic demographic factors. However, the predominantly urban population in our study may limit the generalizability of our findings to rural settings, where access to healthcare and risk factors for stillbirth may differ significantly.

Stillbirth Rates and Prevalence

While our case-control study design did not specifically aim to determine the stillbirth rate, comparing our findings with the rates reported in other studies provides important contextual information about the burden of stillbirth in different settings.

Agarwal V and Agarwal N (2023)[47] reported a stillbirth rate of 17.2 per 1000 births in their hospital-based retrospective study of 4520 deliveries, which yielded 78 stillbirths. Similarly, Kulkarni N et al. (2019)[50] found a stillbirth rate of 16.8 per 1000 births in their review of 14,696 deliveries at a tertiary care center in South India, which included 247 stillbirths. These rates from Indian studies are considerably higher than the rate of 6 per 1000 live births reported by Kashif U et al. (2022)[48] in their study at the Aga Khan University Hospital in Karachi, which identified 207 stillbirths among 32,413 live births.

The highest stillbirth rate among the comparative studies was reported by Changede P et al. (2022)[48], who found a rate of 30.3 per 1000 total births in their tertiary care center in Mumbai, with 275 stillbirths among 9074 deliveries. This substantial variation in stillbirth rates across studies (ranging from 6 to 30.3 per 1000 births) likely reflects differences in study populations, definition criteria for stillbirth, quality of antenatal care, socioeconomic factors, and institutional characteristics. Tertiary referral centers typically report higher stillbirth rates due to referral bias, as they tend to receive more complicated cases with higher risk of adverse outcomes.

The World Health Organization (WHO) estimates that globally, approximately 2 million stillbirths occur annually, with the vast majority (84%) in low- and middle-income countries. The rates observed in most of these studies, including the Indian studies, exceed the WHO target of 12 stillbirths per 1000 total births by 2030, highlighting the significant work needed to reduce stillbirth burden in these settings.

Our case-control methodology, while not designed to establish population-based stillbirth rates, provides detailed insights into the causes and associated factors of stillbirth in our setting. This information is crucial for developing targeted interventions to address the specific preventable causes identified through the ReCoDe classification system.

Maternal History and Risk Factors

Our study identified several maternal complications that were significantly more common in the stillbirth group compared to controls. These included prior miscarriage ($p = 0.001$), previous cesarean section ($p = 0.001$), essential hypertension ($p = 0.001$), pregnancy-induced hypertension (PIH) ($p = 0.001$), anemia ($p = 0.0001$), and acute respiratory distress syndrome (ARDS) ($p = 0.023$). These findings highlight the importance of maternal medical and obstetric history as risk factors for stillbirth.

Agarwal V and Agarwal N (2023)[47] similarly identified pregnancy-induced hypertension (PIH), preeclampsia, and eclampsia as significant maternal factors associated with stillbirths. They also noted that these complications were more prevalent in un-booked mothers compared to booked cases, suggesting that

inadequate antenatal care may exacerbate these risks. In our study, we did not specifically analyze the booking status of mothers, which limits comparison with this aspect of their findings.

Kashif U et al. (2022)[48] found pre-eclampsia to be the most common maternal condition, affecting 14.9% of their stillbirth cases. This aligns with our finding of a significant association between PIH and stillbirth. Hypertensive disorders of pregnancy appear consistently across studies as major risk factors for stillbirth, highlighting the critical importance of monitoring and managing blood pressure during pregnancy.

Changede P et al. (2022)[49] reported that maternal conditions, including pre-eclampsia, diabetes, and pre-existing medical disorders, were the leading causes of stillbirths in their study, accounting for 42% of cases either directly or as contributing factors. Similarly, Kulkarni N et al. (2019)[50] observed hypertensive disorders of pregnancy in 27.5% of their stillbirth cases, with gestational hypertension being more common among un-booked mothers compared to booked mothers (41% vs. 24%, $p = 0.005$).

The consistency of hypertensive disorders as risk factors across multiple studies using the ReCoDe classification underscores the importance of early detection and management of these conditions to prevent stillbirths. The significant association of anemia with stillbirth in our study ($p = 0.0001$) is particularly relevant in the Indian context, where maternal anemia remains highly prevalent. This finding highlights the need for effective antenatal iron supplementation and nutritional counseling as potential strategies to reduce stillbirth risk.

Our finding of a significant association between previous cesarean section and stillbirth ($p = 0.001$) is noteworthy and warrants further investigation. The mechanism underlying this association could involve placental abnormalities at the site of the previous uterine scar, compromised uteroplacental perfusion, or uterine rupture in cases of attempted vaginal birth after cesarean. This finding emphasizes the importance of appropriate counseling and close monitoring of women with previous cesarean section in subsequent pregnancies.

The significant association between prior miscarriage and stillbirth in our study (p = 0.001) aligns with Kulkarni N et al. (2019)[50], who reported previous miscarriages in 29.5% of their stillbirth cases. This consistency suggests that women with a history of pregnancy loss represent a high-risk group requiring enhanced surveillance in subsequent pregnancies.

These findings collectively highlight the importance of comprehensive maternal risk assessment, especially for women with previous adverse pregnancy outcomes or pre-existing medical conditions, and the need for tailored antenatal care to mitigate these risks.

Application of ReCoDe Classification in Identifying Stillbirth Causes

The Relevant Condition at Death (ReCoDe) classification system proved to be a valuable tool in our study for systematically categorizing the causes of stillbirth. This classification allowed us to identify specific conditions across multiple domains, including fetal, placental, cord, maternal, and intrapartum factors, providing a comprehensive etiological framework.

In our study, we identified several significant causes of stillbirth across different ReCoDe categories. Among fetal causes, category A7 (presumed chronic fetal vascular occlusion) was significantly more common in cases (10.0%) compared to controls (3.0%) (p = 0.025). Cord-related cause B2 (cord prolapse) was significantly higher in the case group (14.0%) compared to controls (3.0%) (p = 0.001). Placental causes C1 (placental insufficiency) and C2 (placental abruption) were significantly more frequent in the case group (10.0% and 16.0%) compared to controls (2.0% and 6.0%) (p = 0.037 and 0.001 respectively). Maternal causes such as F1 (diabetes), F2 (thyroid disorders), F3 (essential hypertension), and F4 (hypertensive diseases in pregnancy) were significantly higher among cases than controls, with p-values ranging from 0.001 to 0.042. Intrapartum cause G1 (asphyxia) was significantly more common in the case group (34.0%) compared to the control group (12.0%) (p = 0.001).

The effectiveness of the ReCoDe classification in our study is consistent with findings from other studies. Agarwal V and Agarwal N (2023)[47] reported that the ReCoDe classification was able to assign causes to 88% of the stillbirths in their study, demonstrating its utility in identifying contributing conditions. In their study, maternal causes such as PIH and antepartum hemorrhage were most frequent, similar to our findings of significant associations with hypertensive disorders.

Kashif U et al. (2022)[48] found that the ReCoDe classification successfully identified associated conditions in 81% of stillbirth cases, leaving only 18.8% categorized as unexplained. This is comparable to the high rate of successful classification in our study, where only a small proportion of cases (2.0% with I1 and 8.0% with I2) remained unclassified. Their finding that fetal growth restriction (FGR) was the leading fetal cause, observed in 23.6% of cases, differs somewhat from our study, where category A7 (presumed chronic fetal vascular occlusion) was the most common fetal cause at 10.0%.

Kulkarni N et al. (2019)[50] reported that the ReCoDe classification successfully categorized 84.2% of stillbirths in their study, with fetal growth restriction due to uteroplacental insufficiency identified in 25.9% of cases and placental abruption in 10.9%. Our finding of placental abruption (C2) in 16.0% of cases is higher than their reported rate, potentially reflecting population differences or variations in risk factors.

Lu JR et al. (2009)[51] specifically evaluated the effectiveness of the ReCoDe classification in reducing the proportion of unexplained stillbirths. They found that the ReCoDe system classified significantly fewer stillbirths as unexplained (8.5%) compared to the Perinatal Society of Australia and New Zealand - Perinatal Death Classification (PSANZ-PDC) system (14.1%). This aligns with our experience of relatively few unclassified cases, highlighting the comprehensive nature of the ReCoDe system.

The consistent ability of the ReCoDe classification to identify specific causes across multiple studies, including ours, underscores its value as a standardized approach to stillbirth investigation. This standardization facilitates meaningful comparisons between different settings and populations, enabling a more comprehensive

understanding of stillbirth etiology globally and informing targeted preventive strategies.

Role of Fetal and Cord Factors in Stillbirth

In our study, several fetal and cord-related factors emerged as significant contributors to stillbirth. Among fetal causes (category A in the ReCoDe classification), we observed A5 (fetal abnormality) in 2.0% of cases, A6 (fetal growth restriction) in 8.0% of cases compared to 2.0% of controls, and A7 (presumed chronic fetal vascular occlusion) in 10.0% of cases compared to 3.0% of controls. The difference in A7 was statistically significant ($p = 0.025$), highlighting the importance of fetal vascular complications in stillbirth etiology.

Cord-related causes, particularly B2 (cord prolapse), were significantly more prevalent in the case group (14.0%) compared to controls (3.0%) ($p = 0.001$). This finding emphasizes the critical role of umbilical cord complications as immediate causes of fetal demise.

These findings align with several comparative studies. Agarwal V and Agarwal N (2023)[47] identified severe growth restriction as one of the predominant fetal causes of stillbirth, similar to our finding of fetal growth restriction (A6) in 8.0% of cases. They also noted lethal congenital anomalies as a significant fetal cause, which corresponds to our category A5 (fetal abnormality).

Kashif U et al. (2022) reported that fetal causes were identified in 34.7% of stillbirths in their study, with fetal growth restriction (FGR) being the leading cause, observed in 23.6% of cases. Their higher proportion of FGR compared to our finding of 8.0% for category A6 may reflect differences in diagnostic criteria, population characteristics, or the frequency of growth monitoring during antenatal care.

Kulkarni N et al. (2019)[50] found lethal congenital anomalies in 18.2% of stillbirths, which is considerably higher than our observation of fetal abnormality (A5) in 2.0% of cases. They also noted that these anomalies were more frequently diagnosed in booked patients (24.7%) compared to un-booked patients (2.3%), suggesting that the detection rate may be influenced by the quality and frequency of antenatal care.

Lu JR et al. (2009)[51] reported that the ReCoDe system attributed a higher proportion of stillbirths to fetal growth restriction (23.2%) compared to the PSANZ-PDC system (8.2%). Additionally, they found that 44.8% of all stillbirths were classified as small for gestational age (birthweight < 10th customized centile). Their finding that congenital abnormalities were the most common primary cause or condition at death contrasts with our results, where fetal abnormalities (A5) were relatively uncommon.

The variation in the prevalence of fetal causes across studies highlights the influence of factors such as population characteristics, quality of antenatal care, diagnostic capabilities, and classification methodologies. Despite these variations, fetal growth restriction consistently emerges as an important cause of stillbirth across studies, underscoring the value of growth monitoring during pregnancy as a potential strategy for stillbirth prevention.

Our finding of a significant association between cord prolapse (B2) and stillbirth ($p = 0.001$) emphasizes the importance of prompt recognition and management of this obstetric emergency. While the comparative studies did not specifically highlight cord-related causes in their abstracts, cord complications are recognized as important acute causes of fetal demise that may be preventable with appropriate obstetric care.

Placental and Amniotic Fluid Factors in Stillbirth

Our study identified significant placental contributions to stillbirth, with placental insufficiency (C1) observed in 10.0% of cases versus 2.0% of controls ($p = 0.037$), and placental abruption (C2) in 16.0% of cases versus 6.0% of controls ($p = 0.001$). These findings highlight the crucial role of placental pathology in the etiology of stillbirth.

Amniotic fluid-related causes, including D2 (chorioamnionitis) and D4 (oligohydramnios), were observed in both case and control groups (12.0% and 14.0% respectively in cases), but the differences did not reach statistical significance. This suggests that while amniotic fluid abnormalities may contribute to adverse pregnancy

outcomes, they were not independent discriminators between stillbirths and live births in our population.

The significant association between placental pathology and stillbirth in our study aligns with findings from several comparative studies. Kulkarni N et al. (2019)[50] identified placental abruption in 10.9% of stillbirths, which is somewhat lower than our finding of 16.0% but still represents a substantial contribution. They also reported fetal growth restriction due to uteroplacental insufficiency in 25.9% of cases, which likely overlaps with our category C1 (placental insufficiency) found in 10.0% of cases.

Changede P et al. (2022)[49] listed fetal growth restriction as a significant cause of stillbirth (30 cases) in their study, which often reflects underlying placental insufficiency, though they did not specifically report the prevalence of placental abruption or other placental pathologies.

The comparative studies did not provide detailed information about amniotic fluid abnormalities, limiting direct comparisons for these factors. However, the non-significant difference in amniotic fluid-related causes between cases and controls in our study suggests that these factors may be less discriminating than placental pathology in determining stillbirth risk.

Placental pathologies, particularly abruption and insufficiency, represent important potentially modifiable risk factors for stillbirth. Placental abruption is often associated with hypertensive disorders and trauma, while placental insufficiency may be linked to maternal vascular disease, smoking, and other factors affecting uteroplacental perfusion. The consistent identification of these placental causes across studies emphasizes the importance of optimizing maternal vascular health during pregnancy and ensuring prompt recognition and management of conditions that may compromise placental function.

The non-significant difference in amniotic fluid abnormalities between cases and controls in our study should not diminish their clinical importance. Conditions such as chorioamnionitis and oligohydramnios are associated with adverse fetal outcomes and

require appropriate monitoring and management. However, our findings suggest that these conditions alone may not be sufficient to discriminate between pregnancies resulting in stillbirth versus live birth, and other factors likely contribute to determining the final outcome.

Maternal and Intrapartum Causes of Stillbirth

Maternal causes emerged as significant contributors to stillbirth in our study. Specifically, diabetes (F1) was observed in 8.0% of cases compared to 0% of controls ($p = 0.014$), thyroid disorders (F2) in 8.0% of cases versus 0% of controls ($p = 0.007$), essential hypertension (F3) in 12.0% of cases versus 2.0% of controls ($p = 0.042$), and hypertensive diseases in pregnancy (F4) in 32.0% of cases versus 4.0% of controls ($p = 0.001$). These findings highlight the substantial role of maternal medical conditions, particularly hypertensive disorders, in stillbirth etiology.

Additionally, intrapartum asphyxia (G1) was significantly more common in the case group (34.0%) compared to the control group (12.0%) ($p = 0.001$), emphasizing the importance of intrapartum events in stillbirth causation.

These findings are consistent with several comparative studies. Agarwal V and Agarwal N (2023)[47] identified pregnancy-induced hypertension (PIH) as one of the most frequent maternal causes of stillbirth. Similarly, Kashif U et al. (2022) reported pre-eclampsia as the most common maternal condition, affecting 14.9% of their stillbirth cases.

Changede P et al. (2022)[49] found that maternal conditions, including pre-eclampsia, diabetes, and pre-existing medical disorders, were the leading causes of stillbirths, accounting for 42% of cases either directly or as contributing factors. They specifically identified hypertensive disorders in pregnancy as the most frequent cause of stillbirths (76 cases). This aligns with our finding of hypertensive diseases in pregnancy (F4) in 32.0% of stillbirth cases.

Kulkarni N et al. (2019)[50] observed hypertensive disorders of pregnancy in 27.5% of their stillbirth cases, comparable to our finding of 32.0%. They also reported that

medical comorbidities were noted in 46.5% of pregnancies resulting in stillbirth, reflecting the significant contribution of maternal health conditions to stillbirth risk.

The consistent identification of hypertensive disorders as major contributors to stillbirth across multiple studies underscores the critical importance of blood pressure monitoring and management during pregnancy. These conditions can lead to stillbirth through various mechanisms, including placental insufficiency, abruption, and fetal growth restriction. The significant association between diabetes and stillbirth in our study ($p = 0.014$) also highlights the importance of glycemic control during pregnancy to reduce adverse outcomes.

The high prevalence of intrapartum asphyxia (G1) in our stillbirth cases (34.0%) suggests opportunities for improvement in intrapartum care and monitoring. Changede P et al. (2022)[49] reported that antepartum stillbirths constituted 78% of their cases, implying that 22% occurred during labor, which is lower than our finding but still represents a substantial proportion. Intrapartum stillbirths are often considered more preventable than antepartum cases, as they may reflect suboptimal fetal monitoring or delayed intervention during labor.

CONCLUSION & RECOMMENDATIONS

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Conclusion:

This study demonstrates that the ReCoDe classification system effectively identifies specific conditions associated with stillbirth, with only 10% of cases remaining unclassified. The significant associations detected between stillbirth and multiple factors across different ReCoDe categories highlight the often complex and multifactorial nature of stillbirth etiology.

Hypertensive disorders of pregnancy emerged as the most significant maternal contributor to stillbirth, with a nearly eight-fold higher prevalence in cases compared to controls. This finding, consistent across multiple studies, underscores the critical importance of blood pressure monitoring and management during pregnancy. Other significant contributors included placental pathologies (insufficiency and abruption), cord complications (particularly prolapse), and intrapartum events (primarily asphyxia).

The study reveals that stillbirths result from diverse pathophysiological pathways, many of which may be amenable to prevention through improved antenatal surveillance and timely intervention. The identification of specific risk factors such as previous adverse pregnancy outcomes, pre-existing medical conditions, and complications during the current pregnancy provides valuable guidance for risk stratification and targeted monitoring.

Strengths

- Comprehensive classification system: The application of the ReCoDe classification allows for systematic categorization of stillbirth causes across multiple domains, providing a detailed etiological framework.
- Matched demographic profiles: The similar age distribution, residence patterns, and obstetric characteristics between cases and controls strengthen the validity of the identified associations by minimizing demographic confounding.

Limitations

- Single-center design: The study was conducted at a single hospital, potentially limiting the generalizability of findings to other settings with different population characteristics or healthcare systems.

Recommendations

- Implement enhanced surveillance protocols for pregnant women with identified risk factors, particularly those with hypertensive disorders, diabetes, thyroid conditions, previous adverse pregnancy outcomes, and anemia.
- Develop standardized protocols for fetal growth monitoring, with increased vigilance for pregnancies at risk of growth restriction based on maternal risk factors or previous pregnancy outcomes.
- Institute regular blood pressure screening and prompt management of hypertensive disorders during pregnancy, with lower thresholds for intervention in high-risk cases.
- Improve antenatal detection and management of placental abnormalities through increased use of ultrasound assessment of placental location, appearance, and function, particularly in high-risk pregnancies.
- Strengthen intrapartum monitoring practices to reduce asphyxia-related stillbirths, with particular attention to timely intervention for non-reassuring fetal status.
- Establish clear protocols for the management of cord emergencies, including staff training on prompt recognition and intervention for cord prolapse.
- Implement comprehensive preconception counseling programs for women with pre-existing medical conditions to optimize health status before pregnancy.
- Develop integrated care pathways for pregnant women with previous cesarean sections to mitigate the associated increased risk of stillbirth.

- Conduct multicenter studies applying the ReCoDe classification across diverse geographical and socioeconomic settings to enhance the generalizability of findings.

SUMMARY

SUMMARY

- This case-control hospital-based study investigated the causes of stillbirth using the Relevant Condition at Death (ReCoDe) classification system, comparing 50 stillbirth cases with 100 live birth controls. The demographic profiles were similar between groups, with a mean age of 26.41 ± 2.75 years in cases and 26.58 ± 4.04 years in controls, predominantly from urban areas (94.0%), and with comparable obstetric characteristics.

- The study identified several significant maternal risk factors for stillbirth, including prior miscarriage ($p = 0.001$), previous cesarean section ($p = 0.001$), essential hypertension ($p = 0.001$), pregnancy-induced hypertension ($p = 0.001$), and anemia ($p = 0.0001$). Using the ReCoDe classification, various causes of stillbirth were identified across different categories. Fetal causes included chronic fetal vascular occlusion (A7), which was significantly more common in cases than controls (10.0% vs. 3.0%, $p = 0.025$). Cord prolapse (B2) was significantly higher in the case group (14.0% vs. 3.0%, $p = 0.001$). Placental causes showed significant differences, with placental insufficiency (C1) and abruption (C2) more frequent in cases (10.0% and 16.0%) than controls (2.0% and 6.0%) ($p = 0.037$ and 0.001 respectively).

- Maternal medical conditions were strongly associated with stillbirth, including diabetes (F1, 8.0% vs. 0%, $p = 0.014$), thyroid disorders (F2, 8.0% vs. 0%, $p = 0.007$), essential hypertension (F3, 12.0% vs. 2.0%, $p = 0.042$), and hypertensive diseases in pregnancy (F4, 32.0% vs. 4.0%, $p = 0.001$). Intrapartum asphyxia (G1) was significantly more common in cases (34.0%) than controls (12.0%) ($p = 0.001$). Only a small proportion of stillbirths (10%) remained unclassified under categories I1 and I2.

BIBLIOGRAPHY

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ANNEXURES

PROFORMA

(ANNEXURE 1)

CASE RECORD FORM

TITLE: Decoding Still births using "Relevant condition at death(ReCoDe)" classification

.**PATIENT DETAILS**

Name: B/O Name of Mother:

Date of Birth and Time of Birth: Place of Birth:

Date and Time of Sample Collection:

Gender: 1. M / 2. F

Address:

MATERNAL HISTORY

Family History of: HTN / DM / CHD / Hypercholesterolemia: 1. Yes, 2. No

Paternal History of:

Parity: 1. Primi, 2. G2, 3. G3, 4. ≥G4

ANC Check-up: 1. Regular, 2. Irregular, 3. Not taken

ANC H/O LMP: EDD:

PROBLEMS DURING PREGNANCY (PDP)

1. No Problems. 2. Anaemia 3. PIH 4. Pre-eclampsia. 5. Eclampsia

6. APH 7. UTI 8. RHD / CHD 9. Fever 10. Others:

NATAL HISTORY

Mode of Delivery (MOD): 1. Normal vaginal delivery, 2. C-section 3. Others

Birth Asphyxia: 1. Present, 2. Absent

Apgar Score: 1 min: _____, 5 min: _____

Intervention after Delivery (IAD):

1. Not done 2. Stimulation and suctioning 3. Bag & mask ventilation 4. ET tube ventilation

GENERAL PHYSICAL EXAMINATION

1. Normal 2. Abnormal

ANTHROPOMETRY

Weight: _____ Kg (SGA / AGA / LGA)

Head Circumference (HC): _____ cm

Length: _____ cm

Ponderal Index: _____ gm/cm^3

VITAL SIGNS

Heart Rate: _____ / min

Respiratory Rate: _____ / min

Temperature: _____

Capillary Refilling Time: <3 sec / >3 sec

HEAD TO TOE EXAMINATION

- Anterior Fontanelle (AF)
- Eyes
- Ear/Nose
- Oral Cavity
- Neck
- Chest
- Abdomen, Umbilical Cord
- Hip

- Extremities

- Skin

- Back, Anus, Rectal Exam

- Genitalia

- NBR (Neonatal Behavioral Reflexes) - Rooting, Suckling, Moro's Reflex

SYSTEMIC EXAMINATION

CVS: 1. Normal, 2. Abnormal

RS: 1. Normal, 2. Abnormal

PA: 1. Normal, 2. Abnormal

CNS: 1. Normal, 2. Abnormal

ReCoDe CLASSIFICATION:

1. Fetal conditions (A)
2. Umbilical cord (B)
3. Placenta (C)
4. Amniotic fluid (D)
5. Uterus (E)
6. Mother (F)
7. Intrapartum factors (G)
8. Trauma (H)
9. Unclassified (I)

Signature of Investigator: _____

Date: _____

INFORMED CONSENT

(ANNEXURE 2)

Subject Identification No.:

Title of the Study: Decoding Still births using "Relevant condition at death(ReCoDe)" classification

Name of the Principal Investigator: Dr. Raj Vijay Laddha

I have received the information sheet on the above study and have read and / or understood the written information. I have been given the chance to discuss the study and ask questions. I consent for my ward to take part in the study and I am aware that this participation is voluntary. I understand that I may withdraw at any time during the study. I understand that the information collected about my ward from participation in this research and sections of any of my medical notes may be looked at by responsible persons (ethics committee members / regulatory authorities). I give access to these individuals to have access to those records.

I understand I will receive a copy of the patient information sheet and the informed consent form.

_____ _____

Name and Signature of patient/ Date

care taker

For queries contact Dr. Raj Vijay Laddha (+917249339000)

INFORMED CONSENT

सूचित सहमति

इस परीक्षण के लिए विषय पहचान संख्या:

परियोजना का शीर्षक: Decoding Still births using "Relevant condition at death(ReCoDe)" classification

मृतजन्म के कारण एक तुलनात्मक अध्ययन,

प्रधान अन्वेषक का नाम : Dr. Raj Vijay Laddha

मुझे अध्ययन पर सूचना पत्र प्राप्त हुआ है और मैंने लिखित जानकारी को पढ़लिया है /

समझलिया है। मुझे अध्ययन पर चर्चा और सवाल पूछने का मौका दिया गया है।

मुझे जानकारी है कि मेरी भागीदारी स्वैच्छिक है, और मुझे अध्ययन में भाग लेने के लिए

सहमति है।

मुझे जानकारी है मैं सहमति किसी भी समय वापस ले सकता हूँ। मुझे जानकारी है कि मेरी भागीदारी से मेरे बारे में एकत्रित की गई जानकारी और मेरे चिकित्सा नोटों के वर्गों को जिम्मेदार व्यक्तियों द्वारा देखा जा सकता है (नैतिकता समिति के सदस्यों / नियामक अधिकारियों) ।मैं अपने रिकॉर्ड का उपयोग करने के लिए इन व्यक्तियों को सहमति देता हूँ।

मुझे जानकारी है कि मुझे रोगी सूचना पत्रक की और सहमति पत्रकी एक प्रतिदी जाएगी।

_____ _____

नाम व हस्ताक्षर दिनांक

For queries contact Dr. Raj Vijay Laddha (+917249339000)

PATIENT INFORMATION SHEET

(ANNEXURE 3)

Patient's name:

Study Subject No.:

Background to the study: I, Dr. Raj Vijay Laddha, MD Pediatrics post graduate, am conducting a study "Decoding Still births using "Relevant condition at death (ReCoDe) classification ". This study will help in determining the causes of still birth according to ReCoDe classifiction and its prevalence in Santosh Medical College and Hospital, Ghaziabad.

Enrolment in the study: Participation in the study is on a voluntary basis. The subject will not be given any treatments as this is a cross sectional study. Your ward may volunteer to participate in this study after you (the parent) have signed the written informed consent form. Once enrolled, your details will be filled in the proforma. These details will be used while compiling the result. You may leave the study at any point of time if you so desire. If you choose to opt out of the study during any point of time, your details will not be used. This is an absolutely safe study. There is no risk involved per se.

ETHICAL CLEARANCE LETTER

(ANNEXURE 4)

SANTOSH
Deemed to be University
(Established u/s 3 of the UGC Act, 1956)

F. No. SU/R/2023/2489[33] Dated: 26.09.2023

Subject: Grant of Ethical Clearance for **Thesis Protocol** Topic **"Decoding still births using " Relevant condition at death (Re CoDe)"",** submitted by **Dr. RAJ VIJAY LADDHA,** MD/MS student of Batch 2022-2023, Department of **PAEDIATRICS**.

*****

With reference to his/her request for grant of Ethical Clearance for the Thesis Protocol entitled **"Decoding still births using " Relevant condition at death (Re CoDe)"",** **Dr. RAJ VIJAY LADDHA** is informed that the **Thesis Protocol** submitted by him/her was considered by the **Screening Committee** of the Santosh Medical College & Hospital in its meetings held on 17.07.2023 to 28.07.2023. The recommendations of the **Screening Committee** were considered in detail by the **Institutional Ethics Committee** in its meeting held on **23.09.2023** and the same was **approved** by the **Ethics Committee**.

He /She is informed accordingly for further necessary action.

[Dr. NARESH SHARMA]
REGISTRAR

Dr. RAJ VIJAY LADDHA
MD/MS student of batch 2022-2023
Department of PAEDIATRICS
Email: laddharaj9@gmail.com

Copy to:

1. The Vice Chancellor
2. The Dean, SMC&H
3. The Dean – Academics
4. The Dean – Research
5. The Director - IQAC
6. Dr. Veenu Agarwal (Guide)
7. HOD of PAEDIATRICS

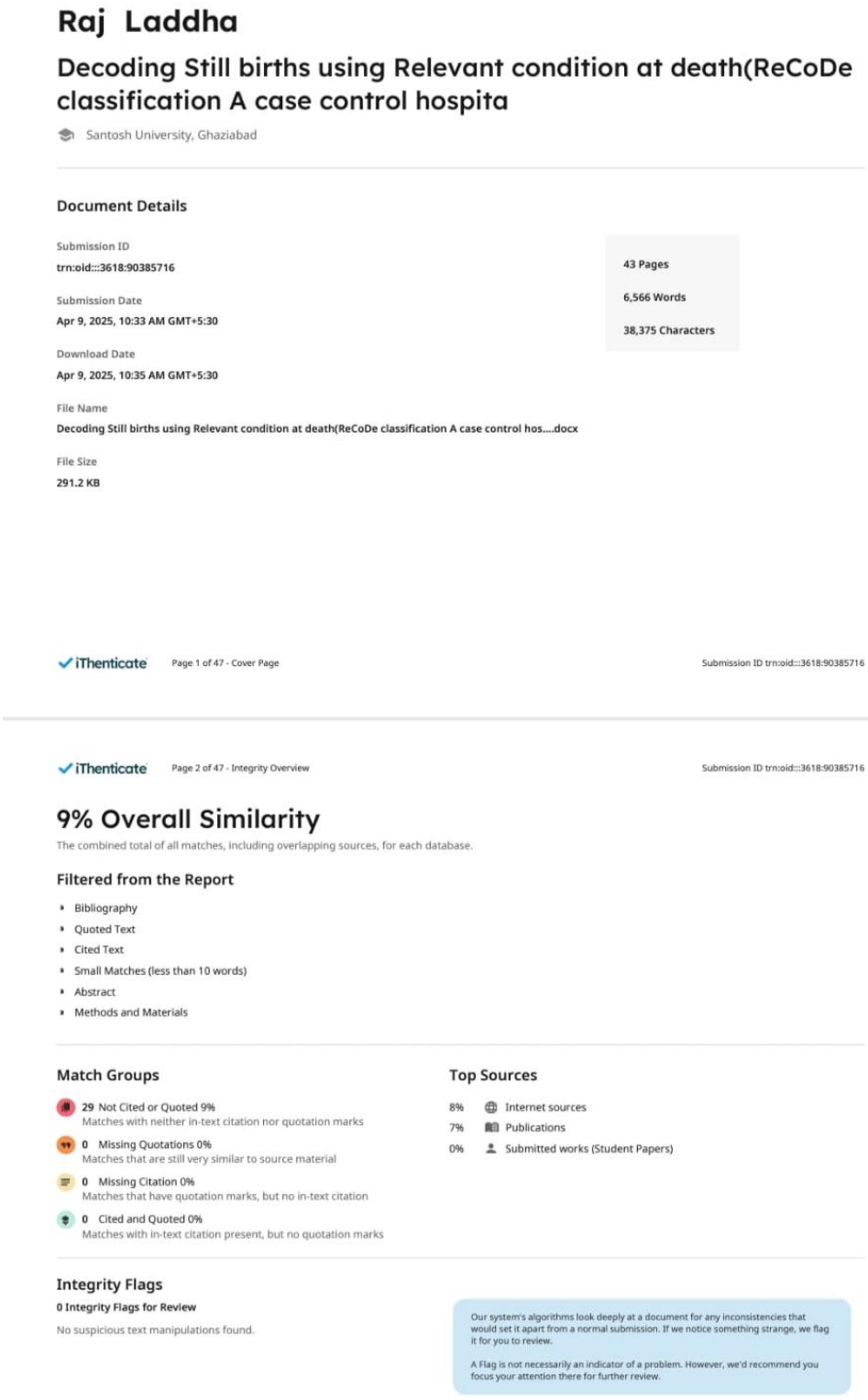
ANNEXURE 5

LIST OF ABBREVIATIONS

Abbreviation	Full Form
ReCoDe	Relevant condition at death
LMICs	Low- and Middle-income countries
WHO	World Health Organization
HICs	High-income countries
HIV	Human Immunodefeiency virus
FGR	Fetal growth restriction
IUGR	Intrauterine Growth Restriction
CMV	Cytomegalovirus
SGA	Small for gestational age
AGA	Appropriate for gestational age
PIH	Pregnancy induced hypertension
PSANZ-PDC	Perinatal Society of Australia and New Zealand - Perinatal Death Classification
BMI	Body Mass Index
GA	Gestational Age

PLAGIARISM REPORT

(ANNEXURE 6)



Raj Laddha

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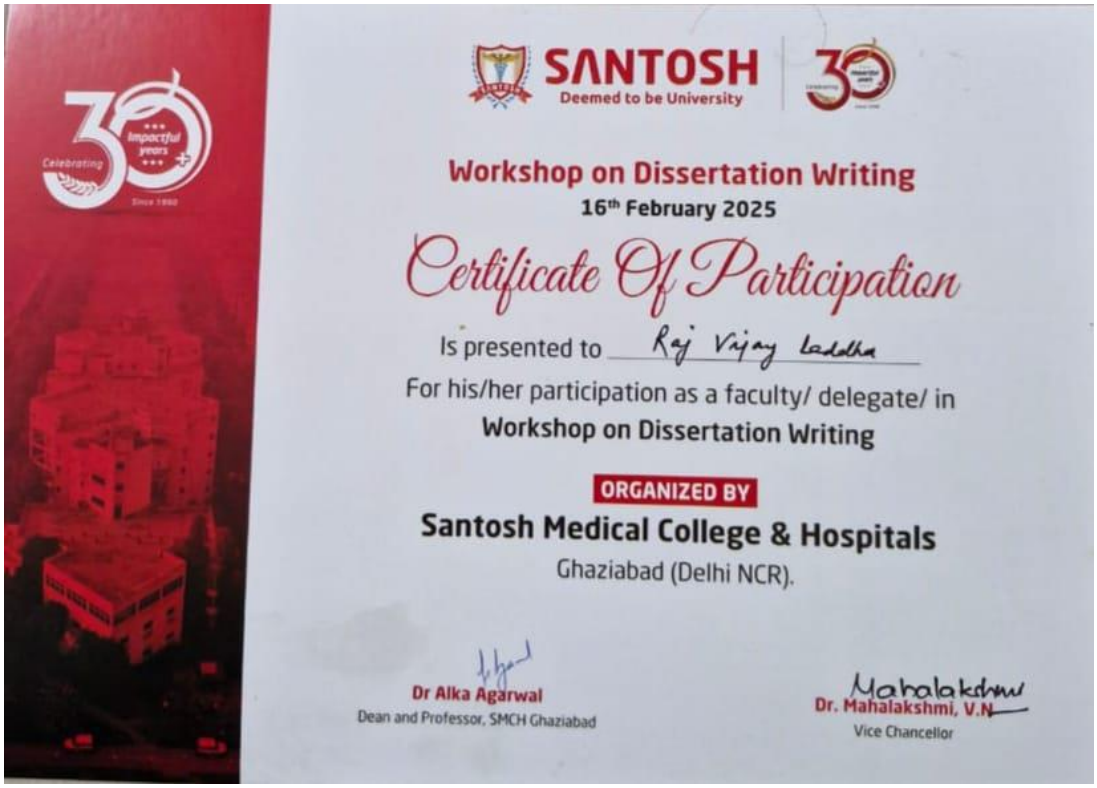

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Workshop on Dissertation Writing

16th February 2025

Certificate Of Participation

Is presented to Raj Vijay Laddha

For his/her participation as a faculty/ delegate/ in

Workshop on Dissertation Writing

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Ghaziabad (Delhi NCR).

Dr Alka Agarwal
Dean and Professor, SMCH Ghaziabad

Dr. Mahalakshmi, V.N
Vice Chancellor

MASTER CHART

Master Chart

group	age	rural/urban	POG	G/P/L/A	Induction of labour	Mode of delivery	infertility	prior miscarriage	previous LSCS	Congenital deformity of uterus	Prior Rh iso	prevoius anamalous baby	DM	Essential HTN	PIH	Others	Single/Twins	Birth weight	congenital anomaly	condition at birth		A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	C1	C2	C3	C4	C5	D1	D2	D3	D4	E1	E2	E3	F1	F2	F3	F4	F5	F6	F7	F8	G1	G2	H1	H2	I1	I2
1	22	urban	39	Primi	yes	vaginal	no	no	no	no	no	no	no	no	yes	-	single	2.4kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no
1	26	urban	36	Multi	no	vaginal	no	3	no	no	no	no	no	no	no	-	single	2.45kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes
1	32	urban	36	Multi	no	vaginal	no	no	no	no	no	no	no	no	no	-	single	2.2kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
1	24	urban	33	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	Anaemia	single	715gms	no	Still birth		no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
1	30	urban	37	Multi	no	LSCS	no	1	2	no	no	no	no	yes	-	single	1.9kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no
1	30	urban	38	Multi	no	LSCS	no	no	1	no	no	no	no	no	no	Thrombocytopenia	single	2.3kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
1	26	urban	40	Primi	yes	vaginal	no	no	no	no	no	no	no	no	no	Pain abdomen and bleeeding pv	single	2.47kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
1	25	urban	40	Multi	no	LSCS	no	no	yes	no	no	no	no	no	yes	Tachycardia with scar tenderness	single	2.4kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	Fever	no	no	no	no	no	no
1	25	urban	37	Multi	no	vaginal	no	1	no	no	no	no	no	no	no	Anaemia	single	2.6kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Anaemia	no	no	no	no	no	no
1	22	rural	38	Multi	yes	vaginal	no	no	no	no	no	no	no	no	no	Anaemia	single	2.3kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Anaemia	no	no	no	no	no	no
1	23	urban	37	Primi	no	LSCS	no	no	no	no	no	no	yes	no	no	-	single	2.6kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no
1	26	urban	36	Multi	no	vaginal	no	3	no	no	no	no	no	no	no	-	single	2.46kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
1	27	urban	36	Multi	yes	LSCS	no	1	no	no	no	no	no	no	no	Bleeding per vaginum	single	2.6kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Bleeding per vaginum	yes	no	no	no	no	no
1	21	urban	39	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	-	single	2.4kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no
1	28	urban	39	Multi	no	vaginal	no	no	no	no	no	no	yes	no	no	-	single	2.5kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no
1	29	urban	36	Primi	no	vaginal	no	no	no	no	no	no	no	no	yes	-	single	3.15kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no
1	26	urban	36	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	Meconium stained liquor	single	2.9kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Meconium stained liquor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
1	29	urban	30	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	Breech delivery	single	not taken	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes
1	26	urban	32	Primi	no	LSCS	no	no	no	no	no	no	no	no	no	ARDS and on Ventilator	single	1.71kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no
1	23	urban	36	Multi	no	LSCS	no	1	no	no	no	no	no	no	no	Anaemia	single	2.30kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Anaemia	no	no	no		no	no
1	26	urban	35	Multi	no	vaginal	no	no	no	no	no	no	no	no	no	DCDA Twin with HBsAg+ with Anaemia	Twins	1.40kg	no	Still birth		no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	DCDA twin with HBsAg+ with Anaemia	no	no	no	no	no	no
1	29	rural	39	Multi	no	vaginal	no	no	no	no	no	no	no	no	no	-	single	2.05kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes
1	28	urban	38	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	Meconium stained liquor	single	3.19kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Meconium stained liquor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
1	24	urban	38	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	Meconium stained liquor with 2 loops of cord around neck	single	3kg	no	Still birth		no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	Meconium stained liquor	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no
1	30	urban	38	Multi	no	vaginal	no	no	no	no	no	no	no	no	no	-	single	2.5kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no
1	28	urban	39	Multi	no	LSCS	no	2	no	no	no	no	no	no	no	Transverse lie with hand prolapse	single	2.4kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no
1	30	urban	40	Multi	no	vaginal	no	1	no	no	no	no	no	yes	no	-	single	2.6kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no
1	27	urban	39	Primi	no	LSCS	no	no	no	no	no	no	no	no	no	Meconium stained liquor	single	2.3kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Meconium stained liquor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
1	24	urban	36	Primi	yes	vaginal	no	no	no	no	no	no	no	no	no	Pain abdomen and bleeeding pv	single	2.47kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
1	28	urban	40	Multi	no	LSCS	no	no	yes	no	no	no	no	no	yes	Tachycardia with scar tenderness	single	2.4kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	Fever	no	no	no	no	no	no
1	25	urban	36	Multi	no	vaginal	no	1	no	no	no	no	no	no	no	Anaemia	single	2.6kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Anaemia	no	no	no	no	no	no
1	22	urban	35	Primi	no	vaginal	no	no	no	no	no	no	no	no	yes	Meconium stained liquor	single	2.9kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Meconium stained liquor	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no
1	28	urban	36	Multi	no	vaginal	no	no	no	no	no	no	no	no	no	DCDA Twin with HBsAg+ with Anaemia	Twins	1.40kg	no	Still birth		no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	DCDA twin with HBsAg+ with Anaemia	no	no	no	no	no	no
1	26	urban	36	Multi	yes	vaginal	no	1	no	no	no	no	no	no	no	Bleeding per vaginum	single	2.6kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Bleeding per vaginum	yes	no	no	no	no	no
1	22	urban	39	Primi	no	LSCS	no	no	no	no	no	no	no	no	no	-	single	2.4kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no
1	27	urban	38	Multi	no	LSCS	no	no	no	no	no	no	yes	no	no	-	single	2.5kg	no	Still birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no
2	22	urban	37	Primi	yes	vaginal	no	no	no	no	no	no	no	yes	no	-	single	2.4kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no
2	26	urban	36	Multi	no	vaginal	no	3	no	no	no	no	no	no	no	-	single	2.45kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes
2	32	urban	36	Multi	no	vaginal	no	no	no	no	no	no	no	no	no	-	single	2.2kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
2	24	urban	39	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	Anaemia	single	715gms	no	live birth		no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
2	30	urban	39	Multi	no	LSCS	no	1	2	no	no	no	no	yes	-	single	1.9kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no
2	30	urban	35	Multi	no	LSCS	no	no	1	no	no	no	no	no	no	Thrombocytopenia	single	2.3kg	no	live birth		no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
2	26	urban	39	Primi	yes	vaginal	no	no	no	no	no	no	no	no	no	Pain abdomen and bleeeding pv	single	2.47kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
2	25	urban	38	Multi	no	LSCS	no	no	yes	no	no	no	no	no	yes	Tachycardia with scar tenderness	single	2.4kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	Fever	no	no	no	no	no	no
2	25	urban	38	Multi	no	vaginal	no	1	no	no	no	no	no	no	no	Anaemia	single	2.6kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Anaemia	no	no	no	no	no	no
2	22	rural	38	Multi	yes	vaginal	no	no	no	no	no	no	no	no	no	Anaemia	single	2.3kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Anaemia	no	no	no	no	no	no
2	23	urban	39	Primi	no	LSCS	no	no	no	no	no	no	yes	no	no	-	single	2.6kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	yes	no	no	no
2	26	urban	40	Multi	no	vaginal	no	3	no	no	no	no	no	no	no	-	single	2.46kg	no	live birth		no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
2	27	urban	39	Multi	yes	LSCS	no	1	no	no	no	no	no	no	no	Bleeding per vaginum	single	2.6kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Bleeding per vaginum	yes	no	no	no	no	no
2	21	urban	36	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	-	single	2.4kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no
2	28	urban	40	Multi	no	vaginal	no	no	no	no	no	no	yes	no	no	-	single	2.5kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no
2	29	urban	39	Primi	no	vaginal	no	no	no	no	no	no	no	no	yes	-	single	3.15kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no
2	26	urban	36	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	Meconium stained liquor	single	2.9kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Meconium stained liquor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
2	29	urban	36	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	Breech delivery	single	2.4kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes
2	26	urban	33	Primi	no	LSCS	no	no	no	no	no	no	no	no	no	ARDS and on Ventilator	single	1.71kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no
2	23	urban	37	Multi	no	LSCS	no	1	no	no	no	no	no	no	no	Anaemia	single	2.30kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Anaemia	no	no	no		no	no
2	26	urban	38	Multi	no	vaginal	no	no	no	no	no	no	no	no	no	DCDA Twin with HBsAg+ with Anaemia	Twins	1.40kg	no	live birth		no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	DCDA twin with HBsAg+ with Anaemia	no	no	no	no	no	no
2	29	rural	40	Multi	no	vaginal	no	no	no	no	no	no	no	no	no	-	single	2.05kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes
2	28	urban	40	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	Meconium stained liquor	single	3.19kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	Meconium stained liquor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
2	24	urban	30	Primi	no	vaginal	no	no	no	no	no	no	no	no	no	Meconium stained liquor with 2 loops of cord around neck	single	3kg	no	live birth		no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	no	Meconium stained liquor	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
2	30	urban	38	Multi	no	vaginal	no	no	no	no	no	no	no	no	no	-	single	2.5kg	no	live birth		no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	no

Master Chart

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